OSTEO-ARTHROPATHY AND ITS RELATIONSHIPS;

WITH ABSTRACTS OF RECORDED CASES, AND A NOTE BY
DR. E. LEGRAIN ON CASES OBSERVED IN THE SAHARA.

ALSO A CASE OF

HYPERPLASTIC OSTEO-ARTHRITIS.

BY

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2. Cases in which only the peculiar clubbed fingers have been noted.

3. A mixed group, including all those cases in which the enlargement of the extremities appears to have been primary, as well as others which are of uncertain nature, whether from insufficient details or for any other reason.

A typical case would present the following features :

1. A history of previous thoracic disease.

2. A peculiar form of clubbing of the ends of fingers and toes.

3. Symmetrical bony enlargements, mainly affecting the articular ends of long bones.

4. Effusions and other changes in neighbouring joints, also roughly symmetrical.

5. Slight overgrowth of adjacent soft parts.

6. Other less constant or less frequently recorded features, dermal, neuro-muscular, vascular, urinary, &c.

It will be necessary to consider some of these factors in detail.

Changes in the finger ends.—1. Great enlargement of the terminal phalanx or soft parts covering it, both antero-posteriorly and laterally—" drumstick fingers,"—in each of which the distal part becomes the biggest.

2. Hyperextension at the last joint.

3. A series of changes in the nail. This is (1) large and wide, overlapping its bed, and reaching to the lateral borders of the fingers ; (2) strongly curved in both directions and curving over the end of the finger, like a watch-glass or a parrot's beak ; (3) the root long and mobile, raised above the level of the second phalanx, so that it can be felt as a distinct ridge, and when pressed upon yields an elastic or semi-fluctuating sensation, or sometimes a more resistent sensation, while the centre of the nail feels firm and hard ; (4) the body of the nail often striated or furrowed in one or both directions ; (5) the colour bright pink, peach-coloured, or more or less cyanotic ; (6) consistence diminished, so that it readily splits or breaks ; (7) growth abnormally rapid.

It will be noted that these characters are an exaggeration of those met with in lesser degrees in the ordinary clubbed

fingers of phthisis, empyema, or heart disease. And although in parrot-beak clubbing the enlargement is mainly antero-posterior and dorsal, whereas in the more ordinary form it is mainly lateral and palmar, intermediate conditions are occasionally met with. Moreover bone changes in the forearm and leg are sometimes found associated with the ordinary type of clubbing. Marie's description, based partly upon the Gouraud case (No. 11) and that of W. Hagner (No. 2), gives the impression that the nail bed is raised by bony overgrowth ; and this may sometimes be the case. But Thérèse and Lefebvre's case (No. 19) and Freytag's case (No. 34), which were typical during life, had no enlargements of the terminal phalanges after death. Arnold's post-mortem examination of the Hagner case showed that there was very little enlargement there ; and other accepted cases do not give the impression that bony overgrowth is the chief cause of the peculiar shape of nail and finger end. It is well known that ordinary clubbed fingers are much less marked after death. The same has been noted in some cases of osteopathy, *e. g.* Springthorpe's case (No. 59). Periodical variations in size are also to be found during life both in ordinary and in parrot-beak clubbing (Cases 19, 64), and in each case the enlargement may sometimes be more or less rapidly removed by suitable treatment of the primary disease. We may therefore safely conclude that in both kinds of clubbing the alteration is mainly due to changes in the soft tissues and their vascular supply. Freytag (Case 34) describes dilatation of the capillary loops under the nail with enlargement of the interpapillary processes, but no other alteration in the skin ; no sclerosis of corium or subcutaneous tissue ; no endarteritis obliterans, and no thickening of nerve-sheaths. In Thérèse's case (No. 19) there was slight hypertrophy of the horny layer, papillæ, and connective tissues of the derma.

The clubbing in osteopathy is usually best marked in the thumb and middle finger, although the index is sometimes as much or more altered than the medius. *In the foot* the big toe is always disproportionately affected. The appearance of the toes is of the same kind as of the fingers, but less characteristic, owing to boot-pressure and other causes.

The *bony changes* have a characteristic *distribution.* The parts affected are the phalanges, which are rendered cylindrical with a slight swelling at the proximal interphalangeal joint; the heads of the metacarpal and metatarsal bones, the lower 3 or 4 inches of the radius and ulna, mainly on the dorsal aspect, the enlargement beginning somewhat abruptly and involving diaphysis as well as epiphysis, and causing a very noticeable increase in the antero-posterior diameter and a smaller increase transversely. The tibia and fibula show a corresponding alteration, but less abrupt and rather more extended; sometimes bony enlargements are found near the elbow-joint, and frequently near the knee-joint; the outer third of the clavicle may be enlarged,[1] the spine and acromion process of the scapula, some of the ribs, and the iliac crests.[2] There is sometimes also disease of the vertebral column, either enlargement of spinous processes, kyphosis, or actual caries, combined at times with scoliosis from the pulmonary or pleural disease. The kyphosis often affects a considerable length of the spine, but is sometimes more localised, as in ordinary caries. Marie had an idea that the kyphosis was more frequently lower dorsal and lumbar, whereas that found in acromegaly was usually upper dorsal and cervical. It would, however, be unsafe to attach much importance to the distinction.

Histologically the bone condition varies somewhat in different cases, owing possibly to the stage of the disease, or may be also to diversity of cause. In all the descriptions the main changes are referred to the periosteum and subjacent bone, and appear to be best marked over parts where most change is noticeable during life. But it is noteworthy that they are also sometimes more widely distributed. Thus in Case 25 (Bamberger) nearly the whole surface of femurs, patella, tibia, fibula, metatarsals, radius, ulna, metacarpals, and phalanges of fingers and toes were affected, the

[1] In Rauzier's case (No. 22) and one of Thayer's (No. 62) the inner end of clavicle was more enlarged than the outer.

[2] In one of Bamberger's cases (No. 29) the sternum was extremely tender on pressure. In Case 25 the tarsal bones were voluminous, and in Case 22 both tarsal and carpal bones. Case 2 (Friedreich-Erb) and Case 11 (Gouraud-Marie) both had enlarged superior maxillæ.

least affected parts being the lower end of the femur and upper ends of tibia and fibula, radius and ulna. The periosteum is usually thickened, sometimes adherent, sometimes readily detached and highly vascular. In Freytag's case (No. 34) two layers were readily distinguishable in the thickened periosteum, the deeper one containing bony spicules or imperfect bone, while the older subjacent bone was unaltered. In Case 25 the affected surfaces were covered with soft, red or bluish-red, velvety or warty osteophytes, lamellar in texture, somewhat like the periosteal deposits in some syphilitic cases, while the subjacent bone was either normal or slightly thickened. The osteophytes varied in coarseness, and were sometimes disposed in fine parallel lines, sometimes forming large bony crests exaggerating natural markings, sometimes bossy or warty projections, while in the least affected parts the surface was finely porous. The nutrient foramina were unusually large. The subjacent cortex was thick and sclerosed, this change being especially noticeable in the spongy bone at the epiphyses. Another of Bamberger's cases (No. 23) merely showed regular thickening and sclerosis of the cortex and epiphysial spongy bone, and Rauzier's case (No. 22) was similar in this respect. Perhaps these represent a slight attack in a later stage. In Thérèse's case (No. 19), described by Lefebvre, the thickened periosteum covered a lamellated deposit of soft new bone in several layers, containing externally no Haversian canals, but a number of flattened channels at right angles to the surface; beneath this irregular bone spaces with medullary tissue containing abundant embryonic cells; and more deeply still a layer of dense bone with enlarged Haversian canals, a similar layer being found next the medullary cavity. The marrow in the medullary cavity was fattily degenerated in the centre, embryonic in character further out. This probably represents a recent stage.

It is noteworthy that whereas the terminal phalanges in Bamberger's case (No. 25) showed warty excrescences on both fingers and toes, those in Freytag's and Thérèse's cases (Nos. 34 and 19) showed no such projections, but were merely porous (Case 19). I omit the histology of Erb's

case, which appears to me not to be typical (see Case 2). A piece of affected bone from Thérèse's case was submitted to *chemical analysis* by Chabrié, who found an increase of organic matters, especially fat, and a considerable increase in magnesium phosphate at the expense of the calcium phosphate and carbonate. These results differ markedly from those published of bones in rickets, osteomalacia, and Paget's ostitis deformans; but more analyses are required before one can be sure of their significance.

Clinically these bone lesions are characterised by comparative absence of pain or tenderness, which are usually only marked where the bones are growing rapidly. The onset may be insidious, with slow, painless enlargement, or very rapid, when decided changes may be noticeable within a few weeks or days, and more pain is usually present at first. A tendency to paroxysmal enlargement has been noted, with stationary intervals.[1] One remarkable feature is the complete absence of any tendency to softening or suppuration, and the consequent absence of adhesions, sinuses, or inflammatory redness over the affected areas. This is very different from what obtains in ordinary tubercular bone lesions, which, moreover, show a different histology and different distribution. The only exception is to be found in the kyphosis, which may sometimes show the ordinary characters of spinal caries, with which it may in such cases be identical. The order of involvement varies, the hands and wrists being sometimes first affected, sometimes the ankles and feet, sometimes both simultaneously.[2]

The *articular lesions* are of a similar sluggish character, and take the form of painless effusions into joints, or of

[1] Cases 7, 22, 35, 38, 49, 61, 62, were apparently gradual and painless in onset; Case 19 gradual with painful exacerbations; Cases 18 (four days), 8 (three weeks), 54 (three weeks), 9, 16, 17, 41, 64, had a rapid onset. In Case 63 the enlargement was gradual, painless in ankles, painful in wrist and knees.

[2] According to Lefebvre the order of frequency is as follows:—Ungual phalanges of hand and foot; articular ends near wrist, those near ankle; metacarpo-phalangeal, medio-tarsal, elbow, knee, sterno-clavicular, and intervertebral joints. If only clinically recognisable enlargements are counted, it appears to me that he under-estimates the frequency of enlargements near wrist, ankle, and knee

synovial and periarticular thickenings, with no tendency to form pus, and very little to soften or break down. As already mentioned, the articular bone ends are usually enlarged, and all these changes contribute to limit the mobility of the joint, which may yield crackling sensations on manipulation. There is usually no acute pain or tenderness excepting in the cases with acute onset, and no migratory tendency as in true rheumatism. So also the tendency to lipping of articular ends characteristic of arthritis deformans is absent in this disease ; and the tendency to increased mobility shown in Charcot's disease is also not found here. The effusions may appear pretty quickly, but are slower in subsiding. The joint changes are usually associated with periarticular thickening, which also extends over the enlarged bone areas. This in the upper limb is free from œdema, but there may be slight œdema about the ankles, which are shapeless and swollen, bulging on either side of the malleoli. Varicose veins are common.

In some of the cases, *e.g.* Rauzier's (No. 22) and Thorburn's (Nos. 49 and 50), the joints resembled white swellings, but without the tendency to progressive disorganisation which these usually present. In Cases 22 and 49 there was erosion of cartilages. In Case 25 these were normal, and in Case 19 there was a little vacuolation in the deep layers in one place, elsewhere no change. Very few complete histological descriptions are on record.

The joints most frequently affected are the wrists, ankles, and knees, less frequently those of hands and feet, elbows and shoulders. In Case 22 the sterno-clavicular joints were enlarged. The changes in the finger-joints mainly consist in bony enlargements of the proximal interphalangeal joints ; the metacarpo-phalangeal joints are also frequently affected, and corresponding joints in the feet. The palm of the hand is usually overgrown so as to encroach upon the fingers ; whereas dorsally the latter appear to enlarge at the expense of the metacarpo-phalangeal region—an exaggeration of the natural relations of the part.

During the progress of a case considerable improvement may be noted in the joints and their surroundings ; as in my own case (No. 64), where mobility and usefulness of the

limbs were to a great extent restored, and the bony enlargements above wrists and ankles markedly reduced in the course of eleven months, with a more rapid reduction of the soft parts.

The *muscles* in this disease are usually somewhat wasted and feeble, but not equally so, those of the upper arm and thigh being markedly affected, and contrasting with those of the forearm and leg, which are relatively well preserved.

The *skin* is usually not hypertrophied; it is tightly stretched and thin over the enlarged parts (especially over the fingers), its folds not being exaggerated as is the case in acromegaly. The coarse hairs are usually ill-developed on the trunk and over the terminal enlarged parts, which latter are often bounded by an overgrowth of hairs. Perspiration is often excessive from the affected extremities. Pigmentation has also been noted over the same areas, and various other skin changes elsewhere, such as xeroderma or ichthyosis, and urticaria.[1] In Thérèse's case there was an entire absence of connective-tissue hypertrophy from the thickened soft tissues, contrasting with what is found in acromegaly.

The *nervous system* has sometimes shown profound changes, *e. g.* in Sollier's case (No. 9); although in many others nothing abnormal has been noted (Cases 19, 22, 10, 41, 64). In Saundby's case (No. 8) there was numbness in the hands, but no anæsthesia; increased muscular irritability; increased superficial reflexes, and absence of patellar and bicipital reflexes. In Sollier's case exaggerated tendon reflexes and muscular irritability, and disseminated patches of altered sensation to heat, cold, pain, and touch; vertigo, slightly defective power of finding tip of nose with eyes shut; defective pressure sense, lightning pains felt always simultaneously in all four limbs, but no visceral crises, and no Romberg's or Argyll Robertson's symptom. In Gerhardt's case there were tremors and paresis, with muscular atrophy (the thyroid was atrophied post mortem). In one of

[1] Pigmentation was present in Cases 8, 18; ichthyosis or keratosis in Cases 9, 18, 59, 64; urticaria in Case 35; excessive perspiration from affected parts in Cases 9, 16, 19, 22 (when doing fine work), 43, 64; multiple nævi in Case 16.

Lefebvre's cases (No. 18) there was sense of burning heat in the feet, vertiginous attacks, sight slightly feeble for distant objects, occasional fits of absence, queer notions, slight deviation of the tongue, athetosis of the toes of one foot, and "tremors of debility." In Waldo's case (No. 12) cavities were found in the brain. In Case 35 there were tingling and numbness in the fingers, cramps in calves and thighs, especially at night, sensation of cold in the hands and feet, sometimes when perspiring freely and hot all over, but no defect of special senses, and all kinds of general sensibility preserved. In Möbius's case (No. 39) there was neuritis of one ulnar nerve, and the parrot-beak change was limited to the region supplied by it. In Thérèse's case (No. 19) the radial nerve appeared to be quite sound.[1]

In many cases abnormalities have been noted in the *ductless glands,* although there is no instance (unless we accept Posmantir's case) in which the hypophysis cerebri has been found enlarged after death—an almost constant condition in acromegaly. The thyroid gland was diseased in Cases 8 and 25 (small, colloid), 10 (absent), 16 (atrophied), 17 (apparently absent), 13 (small), and 56 (enlarged). The thymus was absent in Cases 10 and 59. The spleen appeared to be enlarged in Case 64. There is no evidence of constant changes in the lymphatic glands ; such changes as are found depend upon the primary disease.

The *blood* was abnormally fluid and poor in Hb in Case 64, but appears to have been normal in Cases 43 and 63 ; there was deficient Hb in Case 62.

The *urine* has several times presented abnormalities. In one of Lefebvre's cases (No. 18) there was, at a late stage, decided diminution of urea and phosphates, and transient albuminuria probably from organic renal disease. In Case 20 there was copious albuminuria attributed to lardaceous disease. Legrain states that in his case (No. 55)

[1] In Legrain's case the visual fields were contracted, papillary vessels slightly contracted, fundi pigmented, with commencing staphyloma in one eye; patellar reflexes abolished (No. 55). This case was, however, probably not osteo-arthropathy. In Posmantir's case (No. 56) the patellar reflexes were abolished. There was hyperæsthesia in fingers (?), but no alteration in touch or temperature sense. The pituitary body was found to be enlarged after death, but no note is given as to the sight. This case was probably acromegaly.

there was double the usual proportion of lime salts without any increase in magnesia salts; but I regard this as a case of acromegaly. Rauzier's case (No. 22) showed increase in quantity with low specific gravity. My own case (No. 64) had on several occasions a remarkable diminution in the daily quantity, and in urea, with deposit of lithates and oxalates. In Redmond's case (No. 17) there was excess of phosphates. Case 36 also showed slight albuminuria; Case 43 diminution of phosphates and urea, with a trace of albumen. In Case 13 (not quite typical) there was towards the end a great diminution in urea, chlorides, and phosphates.

The *genital organs* present no enlargement and no constant changes. Functional incapacity or inactivity is usually present; but that would be expected wherever the system is much exhausted by long illness. In Posmantir's case the left testicle was atrophied; but this is a doubtful case.

The condition of the *heart* and *lungs* will be considered with the ætiology. Here it need only be mentioned that the former was often and the latter were almost invariably affected, and that in several cases the veins were either dilated and varicose or thickened. According to Lefebvre the arteries and veins at the wrist in Thérèse's case (No. 19) were normal under the microscope.

Diagnosis.—Where only the finger ends are affected it will be necessary to distinguish osteo-arthropathy from *ordidary clubbing* of heart and lung disease. The relation which these bear to one another will be considered later on. Ordinary clubbing may also be associated with other forms of bone and joint disease. *Chronic rheumatism* of the smaller joints will be distinguished by the history and effects of treatment. *Rheumatoid arthritis* causes more distortion, and gives rise to lipping and nodular projections near the affected joints, which are altered in shape in a more or less characteristic manner. The conditions grouped together by Bouchard under the name of *pseudo-rheumatism* require consideration. They usually come on in the course, or as a sequel of some well-marked febrile disease, such as scarlatina, variola, typhoid fever, gonorrhœa, or pyæmia. They are fixed and oligo-articular, unlike acute rheumatism; are more liable to affect large joints than small, and are frequently

asymmetrical. Sometimes they cause acute pain and tenderness with little local change; at other times there is well-marked effusion with the usual signs of inflammation; in other forms the inflammation is mainly periarticular, in which case it more nearly resembles osteo-arthropathy. The effusions are frequently purulent, and may end in ankylosis or disorganisation. All the attendant circumstances will have to be reviewed in doubtful cases. Symmetrical bony overgrowth would be in favour of osteo-arthropathy. *Gout* will seldom cause much difficulty, as its lesions are usually associated with tophi or other discoverable uratic deposits, and are often unsymmetrical, while a history of a typical acute attack brought on by dietetic causes will be conclusive (see Case 58). Here, again, bony overgrowth is unusual, and when present is apt to simulate rheumatoid arthritis (see Duckworth on Gout). *Tubercular ostitis* and *arthritis* will be distinguished by the presence of signs of inflammation, and often by want of symmetry; and in later stages by a tendency to disorganisation and involvement of skin. It is quite possible that sluggish tubercular inflammations may sometimes accompany osteo-arthritis; but it is extremely improbable that many finger tips would be symmetrically involved in tubercular inflammation.

Syphilitic bone and joint lesions are sometimes more difficult to distinguish. Two cases have been recorded as osteo-arthropathy in which syphilis appears to have been the cause without any thoracic trouble. One (Case 40) appears to be absolutely typical. The other (Case 4) is different in many respects, and probably distinct. Syphilitic hyperostoses affect chiefly the diaphyses of long bones.

Osteo-arthropathy has also been compared with *myxœdema*, but even apart from the bony changes (which are absent in the latter) the differences are far more striking than the resemblances. It is singular that a case of acromegaly, which undoubtedly does resemble osteo-arthropathy, has been recorded as myxœdema.

Bony enlargements associated with œdema and *malignant disease* may sometimes be puzzling, but a careful study will probably reveal striking differences (see Cases 5, 8, 10). *Elephantiasis* sometimes causes enlargement of bones, but

it is usually unsymmetrical and associated with chyluria, &c. *Congenital hypertrophies* will have to be distinguished from osteo-arthropathy in early life (see Case 53). *Ostitis deformans* presents no clinical resemblance to osteo-arthropathy. The spine is always bowed, but the skull is enlarged, and the diaphyses of the long bones lengthened and curved; the finger ends and joints are not altered.

Acromegaly is probably the disease which bears the strongest resemblance to osteo-arthropathy, and the two were originally confounded by Marie himself. The main points of distinction are as follows:

1. Acromegaly comes on gradually in apparent health, especially at and after puberty (fifteen to twenty-five). Osteo-arthropathy comes on after empyema or other chest affection. It may begin rapidly or insidiously, and show remissions and exacerbations, whereas in acromegaly the growth is steady and continuous. Acromegaly is thus regarded as a primary, osteopathy as a secondary disease. When, however, the cause of the former has been discovered, the distinction may turn out to be of little importance.

2. The enlargement in acromegaly does not destroy the shapeliness of the enlarged part, at all events until a late stage; whereas in osteo-arthropathy there is a distortion from quite an early stage. This is because in the latter the main alteration takes place about certain joints and the tips of fingers and toes. Whereas in acromegaly the whole hand or foot is equally affected, or the metacarpal region more than the fingers, in osteopathy there is enlargement of finger ends, phalanges, and proximal interphalangeal joints, heads of metacarpal bones, and large epiphyses next wrists and elbows; while the shafts of metacarpals, radius, and ulna between these points are relatively little affected. There is a corresponding distribution in the lower limb, in which ankles and knees are large, legs and thighs for the most part small. In acromegaly the phalanges, although large, are flat as in health, whereas in osteopathy they are cylindrical, and appear to be lengthened out of proportion to the palm of the hand, while the terminal segments are large and bulbous. In acromegaly the nails are normal in appearance,

and in proportion to the size of the finger, or rather smaller than larger. In osteopathy they are enormous, and strongly curved over tips and sides of the fingers.

3. In acromegaly all the tissues are hypertrophied together in the affected parts, bone and soft tissues in proper proportion. In osteopathy the enlargement is mainly bony, the soft tissues of the fingers being only affected at the tips. There is usually more dorsal than palmar swelling, both of soft tissues and of bone; and in the later stages the soft tissues may waste while the bones continue to grow.

4. In acromegaly joint affection is stated to be exceptional, and when present takes the form of arthritis deformans. In osteo-arthropathy joint affections are extremely common, and show themselves either as simple effusions or else as periarticular thickening.

5. In acromegaly the face is affected, the tongue and lower jaw enlarged. In osteopathy these parts escape.

6. In acromegaly the external genitals, cartilages of ears, eyelids, nose, and larynx are enlarged, whereas in osteo-arthropathy these parts escape.[1]

7. In acromegaly the upper dorsal and cervical region of the spine is mainly affected, whereas in osteopathy it is usually the lower dorsal and lumbar region. In acromegaly the sternum is thickened and enlarged; in osteopathy this does not usually happen.

8. Enlargement of the hypophysis cerebri with symptoms of cerebral tumour and of pressure on optic tracts is the rule in acromegaly, but has been uniformly absent in osteo-arthropathy.[2]

9. Acromegaly proves fatal by its intra-cranial changes; osteopathy need not prove fatal unless the associated lung trouble causes death.

10. In acromegaly there is increase of fibrous tissue around peripheral nerves, spinal ganglia and sympathetic, enlargement with thickening of most of the arteries, and hypertrophy with fibrous increase in the derma and subcutaneous tissue. The sweat-glands are hypertrophied, the skin-folds deep and well marked. Similar changes are found in the

[1] Exceptional cases, Nos. 8, 38, 53, 2, 6, 11, 42.

[2] Unless we accept Posmantir's and Legrain's cases.

mucosa, submucosa, and intermuscular connective tissue of the tongue, soft palate, and larynx. In osteo-arthropathy these changes do not appear to take place.[1]

On the other hand, there are many *points of agreement.* In both we find—

1. Overgrowth of bone and soft tissues without evidenco of decided inflammation.

2. Muscular atrophy and degeneration without paralysis.

3. Changes in sensation, excessive perspiration, pigmentary and other skin changes.

4. The ends of the limbs hypertrophied, some part of the spine or some the ribs.

5. Vascular and respiratory organs affected, either previously or subsequently to the changes in the extremities.

6. Rough thickened bones with large vascular channels.

7. No elongation of bones, excepting the lower jaw in one and possibly the phalanges in the other.

8. Bilateral symmetry.

These points of agreement warrant us in suspecting a common mechanism, though not necessarily a common cause. The differences, however, are sufficiently well marked to enable us to readily distinguish typical cases of the two complaints.

There is, however, a small group of cases [2] which seem to occupy an intermediate position. One of these, the Gouraud-Marie case (No. 11), was the subject of Marie's original description.

The main characters of this group are as follows:

1. There is no clear history of previous lung disease.

2. The face, facial bones, and tongue may be affected, and there is more swelling of soft parts than is usual in osteo-arthropathy.

3. The histology (judging by Case 2) agrees with that of acromegaly.

[1] In the elder Hagner (Case 2) similar changes were found, but Arnold regards this as a case of acromegaly, I think with reason.

[2] Nos. 2, 3, 6, 11, perhaps also 42, 51, 12. In Cases 55 and 56 we seem to have the appearances of osteo-arthropathy with enlargement of the hypophysis cerebri. Case 14 (Renner) probably also belongs to this group.

On the other hand :—

4. The limbs have the appearance of osteo-arthropathy, large curved nails, clubbed finger ends, bony enlargements near the joints, and similar deformities in the lower limbs.

5. There is no evidence of enlargement of the pituitary body or of pressure on optic tracts, and the lower jaw is usually unaffected.

6. The genitals are not enlarged.

The disinclination of some German authorities to recognise osteo-arthropathy as clinically distinct has, I believe, largely arisen from the accident which caused Marie to choose one of this group for his original description, instead of a representative of the more numerous ordinary type. Every one of these cases has been disputed, some regarding them as acromegaly, others as osteo-arthropathy. Those who still regard them as osteo-arthropathy will have to abandon the view that the latter is necessarily secondary to lung disease.

Hypertrophies of the extremities are also met with in *syringomyelia,* which roughly resemble acromegaly and osteo-arthropathy. The hands and fingers in one of these cases (that of Holschewnikoff [1]) were enlarged but in good proportion. The nails strongly curved from side to side and longitudinally furrowed and inclined to split, but not enlarged. The skin of the hand thickened and cleft, but not adherent. Increased mobility at some of the metacarpo-phalangeal joints, and some extra-articular exostoses. Feet plump, with very broad soles and massive toes. The usual condition was found in the spinal cord ; hypophysis cerebri normal ; peripheral nerves connected with the hypertrophied parts degenerated. During life there would in such conditions be found a dissociation between the different forms of sensation, with a loss of the sense of pain and temperature. It will be noted that the joint changes resembled those of Charcot's disease, but were less advanced, and affected the smaller joints. The rhagades remind one of incipient perforating ulcers but for their position.

Erythromelalgia is characterised by enlargement of fingers, but these are largest at the base, livid and wanting in

[1] 'Virch. Arch.,' 1890, cxix, p. 10.

sensation. There is a tendency to hæmorrhages and gangrene. The lividity may extend up the arm, and be associated with kyphosis and a notable diminution in the sense of position. It is unlikely that it should be confounded with osteo-arthropathy. There is probably no true hypertrophy in such cases.

Hypertrophy of extremities has also been met with in several *other nerve lesions, e. g.* in hemiplegia, neuralgia, neuritis, and excision of nerves. These are mainly interesting for the light they throw upon the nature of the disease, and are unlikely ever to be confounded with osteo-arthropathy.

Ætiology.—Deducting fourteen doubtful cases (Class III) from the sixty-seven reputed cases on which this paper is based, there remain fifty-three,[1] of which twelve belong to Class II, in which only the ends of fingers and toes appear to be affected.

Age and Sex.—The youngest case on record is Field's (Case 53), a boy of about one year old, seen at seventeen months. The oldest were Gerhardt's (No. 16) and Marina's (No. 41), both of whom were over sixty when the swelling began. If we include all of Bamberger's cases the numbers are fairly evenly distributed up to about fifty years, after which they become less frequent. Taking into account the numbers living at various ages, this probably indicates that the tendency steadily increases with increasing age. Most of those in Class II were children. As regards sex we find an overwhelming proportion of males (Class I, three female to thirty-seven male; Class II, three female to six male). Only one of the females (Case 17) was affected during menstrual life, the rest being before the establishment or after the cessation of menstruation.

Thoracic antecedents.—The vast majority were preceded by some kind of lung disease. The possible exceptions were six in number, as follows.

Case 13.—Acute rheumatism sixteen years previously. Signs of early pulmonary tuberculosis on examination, regarded by Marie as the cause, but considered by the

[1] Since this paper was written Mr. Godlee referred at the Pathological Society to three more cases (May 19th, 1896).

reporters to have been subsequently developed, as the attack had begun three years before, and the lung trouble was quite recent.

Case 32.—Aortic insufficiency from ulcerative endocarditis ; old pleuritic adhesions.

Case 33.—Pulmonary stenosis and aortic insufficiency, with only the congestion of lungs which usually accompanies such lesions.

Case 40.—Syphilis ; no evidence of thoracic disease.

Case 48.—Attributed by Marfan to pyelonephritis ; no evidence of thoracic disease.

Case 52.—Mitral stenosis with slight pulmonary congestion.

Cases 13 and 40 seem to have been quite typical in appearance. The clinical description of the other cases is too brief to determine their position.

The kind of lung trouble was as follows :—In eighteen there had been empyema or pleuritic effusion, with or without tubercle ;[1] in fourteen chronic bronchitis or bronchiectasis ;[2] nine were phthisical without having empyema ;[3] two had had pneumonia (Cases 17, 41) ; two were suffering from malignant disease of the chest (Cases 8, 10) ;[4] one had a complication of visceral lesions due to congenital syphilis, including gummata in the liver, extensive adhesions and thickenings in the peritoneum, a puriform mass in front of the uterus, and an abscess cavity containing caseous matter in the lower lobe of the right lung (Case 43) ; one a pulmonary abscess communicating with a cavity in the spine, together with pleural effusion (Case 35) ; and one a caseating mass in lung together with aortic stenosis and other visceral changes (Case 12). In this enumeration each case is referred to what appears to be the most prominent lesion ; but some might have been put into a different group with almost equal propriety.

[1] Cases 9, 18, 22, 38, 54, 57, 59, 61, 62, 63, 65, 1, 15, 20, 37, 44, 45, 46.

[2] Cases 16, 23, 24, 25, 26, 27, 28, 34, 36, 39, 60, 64, 21, 47, 53.

[3] Cases 7, 19, 25, 29, 30, 31, 49, 50, 66. Case 25 had bronchiectasis as well as tubercle.

[4] Sarcomatosis also seems to have been present in Case 5, but this may not have been a typical case.

Heart.—In addition to the three cases in which there was heart disease without any active lung disorder, a certain proportion of the lung cases had also cardiac disease. In Case 12 there was aortic stenosis with caseating pneumonia; in Case 30 there was pulmonary stenosis with tuberculosis; in Case 31 aortic insufficiency and tubercle; in Case 25 dilated and hypertrophied right heart, chronic and subacute tuberculosis, pleural adhesions, and dilated bronchi; in Case 34 dilated and hypertrophied heart, pleural adhesions, and bronchiectasis; in Case 39 feeble cardiac action, left side of chest fixed with dulness, rhonchi, and bronchial breathing over base, probably due to pleuro-pneumonia; in Case 59 adherent pericardium, large, flabby, dilated heart, and right empyema; in Case 64 heart permanently displaced to left, action very frequent, a rigid chest with thickened pleuræ and quiescent tubercle, probably also bronchiectasis; in Case 54 heart slightly displaced downwards and to the left. On the other hand, in Cases 19, 22, 43, the heart was found to be normal after death, and it appeared to be so in Cases 18, 49, 50, 57, and perhaps in others. Heart disease is, therefore, not an essential for the production of the deformities. Moreover these were not so well marked in the purely cardiac cases.

Is the *presence of pus* necessary? That it was present either alone or as muco-pus in nearly all the cases is evident from what has already been said. The only clear exceptions were the heart cases (Nos. 32, 33, and 52) and Case 40, in which there was a history of syphilis but apparently no heart or lung disease. No post-mortem examination of this case has, however, been published, and as syphilis has a tendency to form lowly organised tissue with little vitality, the exception may be more apparent than real. Syphilis can replace suppuration as a cause of lardaceous disease; so also perhaps as a cause of osteopathy. Bamberger had a theory that the bone lesions depended on the presence of *fœtid secretions* in the chest. But this cannot be correct, as in my own case (No. 64) the patient expressly denied that the sputa had ever been offensive, and they were certainly not so while he was under observation. Moreover it would have surely been mentioned if this condition was present in other

cases. The relation to *tuberculosis* demands more consideration. Thorburn suggested that the bone and joint lesions were probably a mild form of tubercular inflammation, in which the system was successfully withstanding the disease. He does not make it clear whether he expected to find the tubercle bacillus in the affected structures, or merely regarded the inflammation as caused by the absorption of tubercular toxines. The former is highly improbable, as the lesions do not agree in their distribution and histology, and show no tendency to break down or to involve the derma. Many cases are on record in which from thirty to sixty bone and joint lesions have been present, and yet not one of these lesions has shown the characteristic tendencies of tubercular troubles. Then, again, with such multiple lesions, how is it that the seats of election of tubercular ostitis are not predominantly affected, and often escape? And how are we to account for their symmetry? Thorburn compares the condition to some cases of lupus, but even benign lupus shows nodular growths.

The second hypothesis is more reasonable, although I believe it only contains half the truth. Many of the cases showed no signs of tubercle, and Bamberger expressly states that several of his were non-tubercular, and were proved to be so after death (Nos. 23, 27, 33). The same is true of Freytag's case (No. 34).

Ewald's case proved to be extensive carcinosis without any tubercle (No. 10). In Rauzier's case (No. 22), which also was examined after death, no tubercle was found, and no heart disease, and the disease had been present for years without cachexia, although it is true the periarticular condition at wrists was suggestive of tubercle. In Case 43 the lesions found were those of congenital syphilis, and it seems quite unnecessary to assume that the abscesses in lung and pelvis were tubercular. In Case 59, where death took place after great emaciation, empyema was found, but no tubercle. Had the empyema been tubercular they would surely have found tubercle elsewhere in an unmistakable form. Thorburn's heart case (No. 52) is another case in point, and we may add two of Bamberger's heart cases (32, 33). Other cases are also recorded in which there was no evidence of

tubercle during life, but they are less conclusive in the absence of a post-mortem examination.

Then, in the next place, a case is on record where empyema and early tubercle of lungs were present together, and where the deformities nearly disappeared on curing the empyema, although the tubercular signs remained (Case 36). In another case the lesions were apparently due to an empyema started by pneumococci (No. 45). Several other cases also seem to have been pneumonic in origin. And if we are to accept the case referred to by Marfan (No. 48) the condition here appears to have been due to pyelonephritis from *Bacterium coli-commune*. Thorburn refers to the frequent presence, near undoubtedly tubercular bone and joint lesions, of osteophytic growths exactly resembling those found in osteopathy. But such growths are also found in cases without any suspicion of tubercle. We may, therefore, conclude that tubercle as such is not a necessary antecedent.

The case for *syphilis* is a much weaker one. Two well-marked cases appear to have been caused by this disease. In Schmidt's case (No. 40) there was no post-mortem examination, so that heart and lung troubles may after all have been present. The bone and joint changes took place during the tertiary stage of the acquired disease, and were cured by KI, as also a syphilitic ulcer of the tongue which appeared subsequently. In Chrétien's case (No. 43) there was also lung disease, impeded heart action, and a pelvic abscess. The deformities appeared in a late stage of the congenital disease, and were uninfluenced by treatment. Case 16 also had a history of syphilis. Smirnoff's case (No. 4) was not typical, and cannot be safely included. Case 55, another doubtful case, was also probably syphilitic.

Vascular conditions.—Bamberger's and Thorburn's heart cases show that heart disease may cause not only clubbing, but also bony enlargements indistinguishable from those of osteopathy, but for the most part sparing the smaller bones. It is not yet proved that characteristic osteopathy, with the parrot-beak clubbing as well as bone changes, can result from heart disease alone; but even if the two conditions are not identical, they must be very closely related. Apart from hypertrophic bone changes the two kinds of clubbing differ

only in degree, so that the mode of production of the commoner should throw some light on that of the less usual deformity. Ordinary clubbing consists in congestion with overgrowth of the less important tissues—or, as Dr. Acland once put it in conversation, it is "a case of forced feeding." To produce the capillary tension required for such a result, there must be a fairly strong heart, fairly good nutritive supply and digestion, uncontracted arterioles, and moderate fulness of the vascular system. Slight venous obstruction would tend to increase the capillary tension, provided the heart was strong. A similar explanation would also account for the bony hypertrophy. It is highly probable that minor degrees of bone change, not clinically recognisable, are commonly associated with clubbing of toes and fingers. Systematic skiagraphy would perhaps throw some light on this. Ordinary clubbing may, however, not be solely a mechanical result, as it is sometimes absent where there appears to be a high degree of long-continued obstruction in the chest, and where one would expect to find it on the mechanical theory. The bony clubbing may be partly a reflex result of imperfect oxygenation of the blood. One would expect a physiological sympathy between blood aëration and the activity of the blood-forming organs, of which red marrow of bone is one.[1] In this case the capillary congestion would be arterial rather than venous; and this is supported by the fact that in phthisis the clubbed finger ends are often of remarkably good colour, quite free from cyanosis. However this may be, it is quite clear that in the early stages of osteo-arthropathy an active congestion of the finger tips has frequently[2] been present, possibly in all cases; this congestion has in several recorded cases increased and decreased *pari passu* with the amount of secretion from the pleura[3] or from a tubercular lung;[4] and the same thing has been noted by Mettenheimer and myself in cases of ordinary

[1] The bone changes in osteopathy occur mainly in parts distant from the heart and rich in spongy bone; the clubbing in distant ill-supported parts with a relatively large outer surface.

[2] Cases 7, 10, 15, 37, 45.

[3] Cases 15, 37, 45.

[4] Case 7.

clubbing. It is, therefore, probable that both the latter and the changes of osteo-arthropathy are partly due to humoral causes, not necessarily identical, but at all events closely related.

The vast majority of cases of osteo-arthropathy have followed either empyema or bronchiectasis, and most of the remainder have come in the course of phthisis—all three conditions in which retained secretions are present; and the preponderance of the first two may be explained by the greater facility for absorption afforded. We have in empyema a huge serous cavity filled more or less tensely with purulent secretion, with highly vascular walls; at the same time there is stagnation from imperfect movement of chest walls, and hindrance to the passage of blood through the lungs—both of them conditions which prevent the due oxidation of waste matters. In bronchiectasis we have a very similar condition, excepting that the accumulation is not in a lymphatic sac; and there is usually either emphysema or thickened pleura, which hinders aëration of the blood. The only other large collection of pus which is stated to have led to osteo-arthropathy is Marfan's case (No. 48), in which there was pyelonephritis. There is, however, no detailed description of this case.

There is evidence in several cases that the *blood* is changed in osteo-arthropathy. Urticaria, which is noted in several cases, has been shown by Wright and others to depend not only upon nervous but also on humoral causes, and to be often associated with an abnormally fluid state of the blood, whether from the presence of peptones, the excess or deficiency of calcium salts, or other causes. It is tempting to connect this with the chemical changes in bone and urine noted by Lefebvre and Legrain; but it would be unsafe to generalise from so few data, especially as the latter case is a doubtful one. In Orillard's case (No. 35) attacks of urticaria corresponded with diminished extensibility of elbows and increased swelling of finger ends. In my own case (No. 64) the blood was very fluid, and deficient in red corpuscles and hæmoglobin. If the deformities are due to the absorption of a poison the condition of the excretory organs should influence the result. And it is noteworthy that the kidneys

have been affected in several cases (12, 18, 20, 36, 43, perhaps 64).

So little is known of the *ductless glands* that their influence in the production of osteo-arthropathy cannot usefully be discussed. It is, however, highly probable that they are in some way concerned.

The state of the *nervous system* must also be considered. Just as urticaria is markedly under the influence of the nervous system, so also this abnormal swelling of finger tips and other parts has been shown to depend on nervous influence. Not only have various nervous symptoms been noted in recorded cases, such as neuralgic pains, sensation of heat, tingling, &c., but in one remarkable case (No. 39) ordinary clubbing was converted on one side into osteopathy apparently by an injury to the nerve supplying the part. In this case a locksmith aged fifty-one, who had had pneumonia eight years before but had apparently completely recovered, was taken ill in December, 1891, with a bad cough, profuse perspirations, and debility. After some weeks the sputum became fœtid, but the general health improved. In January, 1892, he had pains in the right little finger and the same side of the fourth finger, which increased and went up to the elbow, disturbing his sleep. About a week before the pain the fingers had become thickened. In February the pains were better but the hands weaker and more useless, so that he sought medical advice. On examination there was neuritis of the right ulnar nerve with paresis of parts supplied by it, and parrot-head clubbing of the fourth and fifth fingers of the right hand. All the other fingers of both hands showed ordinary clubbing. The chest was rigid on one side from the results of old pleuro-pneumonia. When questioned he remembered that in the previous November a heavy iron plate fell on to the fourth and fifth fingers of the right hand.

Here a neuritis converted an ordinary clubbing into a condition apparently identical with osteo-arthropathy. However, it is pretty plain that if osteo-arthropathy is due to a nerve lesion, this is not usually a neuritis or polyneuritis. Any other lesion producing long-continued dilatation of arterioles would be competent to produce the peripheral

changes, and although it is highly probable that a nervous mechanism is involved, the hyperæmia might well be sub-inflammatory and due to a humoral cause. Bone and joint changes are sometimes due to central nerve lesions—witness Charcot's joint disease and syringomyelia. But such trophic lesions are usually more destructive and less hypertrophic, although there are also nervous hypertrophies on record. No single lesion of the nervous system would, however, account for the wide-spread symmetrical changes met with in osteo-arthropathy, whereas these could readily be explained by a humoral cause. Is this likely to be intrinsic or extrinsic ? Against the former is the absence of hereditary tendency, or of any common factor relating to habits or conditions of life. If there were a constant change in osteo-arthropathy referable to one of the metabolic organs (as, *e.g.*, is found in myxœdema and Bright's disease), or one chemical substance constantly present (as is the case in gout), this would be strong evidence in favour of the intrinsic origin of the poison of osteo-arthropathy. Failing all such evidence, it appears more probable that the cause is from without. The diversity of the associated respiratory conditions points to one of two conclusions. Either osteo-arthropathy is a complication of many different diseases (just as tubercle may be a complication of typhoid fever, measles, or ordinary bronchitis), or it is not a separate disease at all, but a group of symptoms dependent upon a common mechanism, which may be excited by a number of recognised diseases. The absence of any definite course is an argument in favour of the latter hypothesis. That most or perhaps all of the associated diseases are bacterial in origin, and that no correspondence can be traced between the intensity of the primary disease and the degree of peripheral changes, favours the conclusion that the common factor is of the nature of a toxine or ferment ; but it does not follow that this is always identical in its origin. There is nothing improbable in the hypothesis that it may be sometimes tuberculous, sometimes syphilitic, sometimes the product of yet other causes. Just as many different zymotic diseases are capable of producing arthritis, so also they may be able to produce distal hypertrophy and periosteal

changes. The rarity of suppuration in the peripheral changes of osteo-arthropathy and its frequency where bacteria are embedded in the tissues make it probable that only a toxine and not the microbes themselves are concerned in the hypertrophic changes.[1] That these changes are not more frequently recorded may be due to their having been overlooked or disregarded in their minor degrees, or to the action of some protective mechanism which only occasionally fails. The recorded cases are evidently not all of the same kind.

To begin with, we have the group which lies intermediate between acromegaly and osteo-arthropathy (see p. 14), in which the distal hypertrophies appear to be primary. These could only be accepted as osteo-arthropathy if the latter should prove to be due to a distinct extrinsic cause, which at present I regard as unlikely. In this group should also be included those cases which have a previous history of lung disease, but which present symptoms characteristic of acromegaly, and not found in ordinary osteo-arthropathy—undeformed, hypertrophied extremities, enlarged tongue and lower jaw, or symptoms pointing to enlargement of the hypophysis cerebri. In such cases the lung disease is probably an accidental, or merely a modifying circumstance, not the primary cause. Other cases to be excluded are those presenting hypertrophies of nervous origin, whether central or peripheral; congenital or non-symmetrical acquired hypertrophies; cases clinically resembling ostitis deformans, and others already alluded to in the section on diagnosis. The remaining cases might be provisionally grouped into a tuberculous group,[2] a syphilitic group,[3] a group dependent upon pneumococci and the various pyogenic bacteria,[4] a group

[1] Pyogenic organisms sometimes give rise to non-suppurative arthritis, but in this case the bacterial toxines are probably the active agents. It is noteworthy that toxines which dilate the blood-vessels have been obtained by Bouchard from tuberculin, by Charrin and Gley from *B. pyocyaneus*, and by Arloing from staphylococci.

[2] Cases 7, 19, 25, 29, 35, 38, 49, 50, 64, probably also 13, 30, 31; and of Class II Nos. 1, 37, 66.

[3] Cases 16, 40, perhaps also 43; and of the doubtful cases Nos. 4, 55.

[4] Cases 9, 17, 18, 23, 24, 26, 27, 34, 36, 41, 53, 54, 59, 60, 63, perhaps also 22, 28, 39, 57, 61, 62, 12; and of Class II Cases 20, 21, 44, 45, 46, 48, 65, and probably 15.

associated with malignant disease,[1] and a group dependent upon heart disease and other circulatory disturbances.[2] The cases in which the hypertrophy is confined to the ends of fingers and toes would be eventually placed in one or other of the above-mentioned groups. Some of them are probably identical with ordinary clubbed fingers; but so long as the mode of production of the latter is uncertain it is difficult to say where they should be placed. Parrot-head clubbing cannot be taken as evidence of bony hypertrophy, but a skiagraph would often settle the question. In the absence of conclusive evidence it is, I think, safer to class such cases with those of ordinary clubbing such as we meet with in heart disease.

Abstracts of Cases.

Class I, typical cases.—Nos. 7—10, 12, 13, 16—19, 22—36, 38—41, 43, 49, 50, 52—54, 57, 59—64.

Case 7.—Mettenheimer, 1885. Man æt. 30. Seven years previously had hæmoptysis followed by phthisis. During the last two years fingers and toes became clubbed, and left forearm and hand periodically swollen, corresponding with periods of deterioration in general health. Bony epiphyses of left forearm increased at the same time. The nails became red and large, and their roots could readily be felt during the attacks.

Ref. paper read in summer, 1885, before the West Mecklenburg Surgeons' Society, "Der partielle Riesenwuchs als vorübergehende Krankheits erscheinung," 'Memorabilien,' 1885, p. 449.

Case 8.—Saundby, 1889. A stoker, æt. 37, admitted August 2nd, 1888. Fourteen weeks before admission had difficulty in pulling on his boots. The swelling began on dorsum of feet. A fortnight later pains in ankles and knees

[1] Cases 8, 10, and of doubtful cases Nos. 5, 56.

[2] Cases 33, 52, and probably 31, 32.

and soon after in wrists, while knees swelled and grew stiff. At the end of three weeks backs of hands began to swell, and pains in wrists obliged him to give up work.

On admission, great enlargement of hands and forearms, bones as well as soft parts; skin pigmented, veins swollen, radials enlarged. Fingers thickened, ends bulbous, and nails convex. Knees enlarged, partly from effusion, partly bony enlargement. Veins large and full. Legs uniformly enlarged down to ankles, where synovial effusion. Feet like elephantiasis. Toes thickened. Slight œdema in lower limb, none in upper. Movements impeded and clumsy in wrists, hands, knees, and ankles. Ribs, clavicles, and iliac crests thickened. Ears large, fibro-cartilages thickened. Nose large, probably thickened. Skull unaltered, zygomatics and malars prominent. Chin long and pointed, not thickened. Tongue not enlarged. No loss of memory, headache, affection of special senses, or vomiting. Numbness in hands, but no loss of sensibility. Patellar and bicipital reflexes absent, plantar and other superficial reflexes exaggerated. Muscles wasted and weak; local contractions when percussed.

Post-mortem.—Spindle-celled sarcoma in lungs, one growth growing from wall of branch of pulmonary artery, with caseating pneumonia in its neighbourhood. Horseshoe kidney. Nutmeg liver. Thyroid atrophied, stroma thickened, colloid matter deficient, granulation tissue in some of alveoli, replacing them in large tracts. Pituitary body normal.

Ref. "A Case of Acromegaly," 'Ill. Med. News,' 1889, ii, p. 195. Lefebvre's Thesis, Case 4, 'Des déformations Osteo-articulaires consécutives à des Maladies de l'Appareil pleuropulmonaire,' Paris, 1891.

This case was unusual in the enlargement of ears and nose.

Case 9.—Sollier, 1889. Man, æt. 42, admitted March 20th, 1889. Two years earlier had empyema, which was operated on but not cured. One year later had pains in fingers, and especially in wrists, fulgurating from elbows to finger tips. Then sudden paresis of hands, which began to enlarge. Two months later similar phenomena in the lower limbs.

On admission, muscular weakness, fine tremors in fingers; atrophy of muscles of left arm and right leg; exaggerated reflexes of both kinds; hypertrophy of hands and feet, including adjacent parts of forearm and leg, beginning suddenly above, and involving both bones and soft parts; affecting all segments in proper proportion, but associated with marked clubbing and large parrot-beak nails. Lightning pains felt simultaneously in all four limbs, never separately, sometimes ascending, sometimes descending. Head pains quite recently, but no visceral crises, and no affection of hearing, taste, or smell; recently "near-sighted;" fundus not examined. Painful sensation of heat in feet; tenderness over bones near joints, but not of joints themselves. Diminution in muscular sense, pressure sense, pain, contact, and temperature, in patches disseminated over the whole body, the patches not exactly corresponding with one another.

Ref. "Sur une affection singulière du système nerveux, caractérisée essentiellement par l'hypertrophie des extrémités des membres, des phénomènes paralytiques, et des troubles variés de la sensibilité," 'La France Médicale,' June 13th and 15th, 1889, Nos. 68 and 69. Lefebvre's Thesis, Case 7.

It is questionable whether this case should be included; perhaps it is more nearly related to syringomyelia.

Case 10.—Ewald, 1889. Man, æt. 50, admitted for general weakness. Hands were very big, fingers extremely big and long: skin seemed much thickened. "Hands like paws, but less so than in the photograph of the brothers Hagner" (Cases 2 and 3). Extremities of fingers swollen like a club, and nails big, red like peaches, and longitudinally striated; feet the same. Muscles of upper and lower limbs by no means excessively developed. Forearms and legs corresponded to high stature of the man, very bony, and provided with thick skin and powerful muscles; but musculature of thigh and arm was soft and emaciated, so that there was a contrast between the arm and forearm. Sensibility, patellar reflexes, well preserved. Manifest swelling of glands in supra- and infra-clavicular regions on the left; retro-sternal

dulness, proved after death to be due to degenerated glands. The enlargement of hands and feet had begun two years previously, and been regarded as gouty rheumatism.

Post-mortem. — Extensive carcinosis with hæmorrhagic pleurisy; thyroid and thymus absent.

Ref. 'Berl. klin. Wochenschrift,' 1889, No. 26, p. 238. Lefebvre's Thesis, Case 8.

This case is exceptional as regards the thickened skin. The dulness behind the manubrium sterni, found in several cases, was the subject of much discussion. It is apparently sometimes due to thickening of the sternum.

Case 12.—Waldo, 1890. A man æt. 54, who was in good health until six months before admission, when he found his legs growing weak and stiff, and his knees and feet swollen. Soon after, his hands and fingers began to enlarge. Four days before admission he had an epileptiform fit.

On admission, cachectic with signs of right pleuritic effusion. Hands enlarged and clumsy, the fingers all enlarged and thickened, all the structures participating, and the joints not more affected than the other parts. Grasp feeble and movements impeded. Bones at wrist apparently thickened as well as clavicles, knees, and iliac crests, but not the bones of cranium or lower jaw. Veins of arms and of left knee enlarged, and finger and toe nails more than usually convex. No œdema anywhere. Mental processes affected, but no head pains or affection of sight. Symptoms of bulbar paralysis appeared, and *after death* there were found cavities in the brain, well-marked aortic stenosis, with calcified cusps, a caseating mass in right lower lobe of lungs, cortical cavities in the kidneys, nutmeg liver, right lobe of thyroid absent, pituitary body apparently normal.

Ref. "Acromegaly," 'Brit. Med. Journ.,' March 22nd, 1890. Lefebvre's Thesis, Case 10.

This case is exceptional in the thickening of soft parts of fingers, absence of finger-joint change, and presence of gross lesions in the brain.

Case 13.—Spillmann and Haushalter, 1890. Man æt. 45, admitted February, 1890. A temperate man, who denies

syphilis. Typhoid fever at age fifteen. From 1892 to 1894 inhabited damp rooms on ground-floor. Had acute rheumatism for three months, and pains in limbs for four or five months after. In excellent health till 1887, never had a cold, never coughed, never had shortness of breath. Middle of 1887 began to complain of pains in limbs and about back; more fatigued than usual on leaving his (miner's) work; then noticed wrists enlarging, and almost simultaneously his feet also; then limbs and elbows. Early in 1888 had to leave off work because of weakness and pain in bones and joints. Began to cough a little since the beginning of 1889. Seen in November, 1888, and February, 1890; little change in appearance between these dates.

On admission.—Very sensitive to cold; muscles flabby; lancinating boring pains in bones and joints, worse at night, very marked in lumbar spine. No important changes in nervous system. Heart, vessels, and glands normal, but aortic sounds faint. Slight dulness and diminished breath-sounds under right clavicle, and a few râles here and there. Thyroid small. Voice and larynx normal. Urine towards the end showed diminution of urea, chlorides, and phosphates; otherwise normal. Head and face unchanged. Spine a little bent, tender over last lumbar spines, but neither kyphosis nor lordosis. Some retro-sternal dulness passing beyond margins of sternum, not due to aortic enlargement. Wide-spread tenderness of bones of limbs and pelvis. Thickening of some of ribs, iliac crest, lower third of humerus, whole of radius and ulna (especially lower third), heads of metacarpals, and phalanges (especially terminal). Fingers enlarged in all dimensions from bony hypertrophy; finger ends like clappers of bells; nails very large and broad, recurved, coarsely striated, much thickened and fast growing. Shoulder-joints painful on movement; elbow-joints restricted in movements, which cause pain; wrist-joints not freely moveable; hands cannot be closed. Enlargement of lower third of femur, patella, whole of tibia (especially lower third, which is gigantic), and foot. Thickening of subcutaneous tissues in leg and foot, with a little œdema. A little fluid in knee-joint, and clubbing of terminal phalanges of toes. Skin of body generally dry,

with very little perspiration. Hair and moustaches grew more rapidly since his illness. Complains of much thirst.

Ref. 'Rev. de Méd.,' 1890, p. 361 : 'Contributions à l'étude de l'Ostéo-arthropathie hypertrophiante pneumique.' Lefebvre's Thesis, Case 11.

This case appears to be typical in everything excepting its antecedents. The pulmonary change was so little advanced that the reporters believed it to have developed subsequently to the deformities. Marie took a different view. Perhaps the attack of rheumatic fever paved the way for the changes in the extremities.

Case 16.—Gerhardt, 1890. Coachman, æt. 62, intemperate, with a history of syphilis, gonorrhœa, and intermittent fever. Having become a porter, and begun to live underground, he was attacked with pains in joints of hands and feet, which at the same time began to enlarge.

On admission.—Hands big and awkward, wrist-joints enlarged, together with the epiphyses of forearm. Ungual phalanges much thickened, nails friable, striated in both directions, and loosened by new nails forming underneath. Hairs developed over regions limiting affected parts, *i. e.* over first phalanges of fingers and above lower third of forearms. Feet and lower ends of legs similarly enlarged. Frequent and abundant perspirations over the most affected parts, especially right hand. Many nævi on neck. Tremors and paresis of limbs with muscular atrophy. No fever, but pulse frequent. Thyroid atrophied.

Ref. 'Berl. kl. Wochenschrift,' 1890, p. 1183, "Ein Fall von Akromegalie." Lefebvre's Thesis, Case 17.

Case 17.—Redmond, 1890. A single woman, æt. 19, admitted July 25th, 1890, complaining of great weakness and swelling of hands and feet, and of pain on movement in wrists, knees, and ankles ; also pain in back, right shoulder, and right side, worse at night. Was in good health till March, 1887, when she began to suffer from severe pain in right side, which caused some shortness of breath. About the same time repeated attacks of palpitation. Subsequently became very ill, and was confined to bed from end of May to

middle of July. Was informed she had had inflammation of the right lung. End of August she had completely recovered, and a few months later she was apprenticed to the grocery business, with long hours (7 a.m. to 11 p.m.). Her health soon began to suffer, and menstruation became scanty and irregular. In December, during the prevalence of the influenza epidemic, she noticed that her hands and feet were swollen, sore, and somewhat painful to touch. After a few days in bed the swelling had partially disappeared. Since then her hands and feet remained about the same. Later on her knees began to swell and grow stiff and painful, which interfered with her walking. As far as could be ascertained from the patient, the enlargement of hands and feet attained its present dimensions in a few weeks.

On admission. — Anæmic, but otherwise fairly well nourished. Marked increase in carpal ends of radius and ulna. Backs of hands considerably swollen, but not œdematous. Fingers greatly enlarged, ends bulbous, nails slightly convex. Considerable effusion into knee-joints, with enlargement of heads of tibia and fibula. Below the knees, legs uniformly enlarged, ankles widened, and some effusion in the joints. Feet wider and thicker than normal, toes thickened and bulbous. Œdema of dorsum of feet. Thyroid apparently absent. Urine 1022, excess of phosphates, no sugar nor albumen.

She remained under observation till October 12th, 1890. No marked change in condition of hands, wrists, feet, and knees. From time to time complained a good deal of insomnia, nausea, anorexia, and headache ; troublesome pain in back ; sometimes severe pain in abdomen and sharp attacks of diarrhœa. Temp. 101° to 102°, no perspirations. After leaving hospital, was bedridden with extreme weakness and almost constant diarrhœa, sometimes passing blood.

Ref. "A Case of Acromegaly," 'Trans. Roy. Acad. of Med. Ireland.,' 1890–91, ix, pp. 64—66.

From a plate which accompanies the report there seems to be no perceptible alteration in bones of face and skull. Fingers spindle-shaped, clubbing ill-marked, nails not very large, and look cylindrical.

Case 18.—Lefebvre, 1891. Man æt. 42. History of malaria in 1872. Somewhat intemperate. In April, 1886, right empyema after a chill while perspiring freely. Twice punctured, and then forty days after onset of illness drainage-tubes inserted for irrigation. While in hospital an hypnotic injection was administered. When he woke he had paresis of hands, and had to be fed for a month. At the same time the hands swelled up, reaching present size in four days. After a holiday Estlander's operation was performed in February, 1887, five ribs being resected. In 1888 he had retention of pus, and an illness followed in which he was unconscious for five days. After this he noticed abnormal swelling of extremities, which continued to the time he was examined, in May, 1890. He was then much emaciated, cranium, face, ears, and lower jaw normal; hands enormous, thickened on dorsum; lower ends of metacarpals and adjacent joints enlarged; fingers large and long, with much-swollen terminal segments, hyperextended and bearing large watch-glass nails. Enlargement of wrists, and limitation of movement there and in hands, elbows, and shoulders. Condyles of femurs and malleoli enlarged, with perimalleolar thickening; œdema of legs above boots, increased by warmth; toes deformed like fingers, but less so. Decided pigmentation over face, and dorsum of hands and feet. Ichthyosis over external border of feet, slight keratosis pilaris on legs. Sense of heat in feet, least in morning. Sight a little feeble for distant objects; no amblyopia, no diplopia, no retraction of visual fields. Special senses otherwise normal. Vertiginous attacks while at rest. Intelligence slightly impaired; queer notions, absence of mind. Tremors of debility. Athetosis of right foot, increased by touching it, and by voluntary movements of hand or tongue. Slight deviation of tongue to left. Slight albuminuria for a time. Slight œdema of eyelids in morning. Frequent micturition at night.

Ref. Lefebvre's Thesis, Case 12.

Case 19.—Thérèse, 1891.—Man æt. 38, with a family history of phthisis. Quite well until age twenty-seven, but

given to excesses. Invalided from the army with symptoms of phthisis.

On admission.—Pains in metacarpo-phalangeal joints of hands, knee and ankle joints, followed by swelling. Exacerbations and remissions for three months, when fingers were noticed to be growing larger. At this time the whole hand deviated on ulnar border; on extending the fingers slight flexion persisted in proximal and forced extension in distal phalanges. Finger ends were clubbed, and nails curved both ways, and striated in both directions. Periarticular swellings were present to three fingers' breadth above wrists, and slight difficulty in movement in hands and wrists. Abundant perspirations appeared over the whole upper limb. Knees were globular, with slight effusion and slight periarticular swelling. Ankle-joints slightly enlarged and painful. Toes and their nails deformed somewhat like the fingers. A very complete *post-mortem examination* is recorded, showing bone changes in radius, ulna, and slightly in terminal phalanges and other bones, slight erosion in wrist-joint, enlarged liver, cavities in the lungs. Most of the essential points in this case, on which Lefebvre's Thesis was largely based, have already been given.

Ref. Lefebvre's Thesis, Case 13.

Case 22.—Rauzier, 1891. A chemist, æt. 34, admitted January 16th, 1890. Father had very big hands, and all his collaterals had larger feet than usual. Up to age twenty-one good health, but enlargement of hands and feet already noticed in infancy. In 1875, while in the army, he had mumps and slight orchitis. In 1876 pneumonia, apparently malarial, followed by pleurisy, which became purulent and was several times tapped, then irrigated daily, and finally in 1885 treated unsuccessfully by Estlander's operation. There remained a fistula with copious purulent discharge, excepting when there were, from time to time, attacks of retention; and there was also noticed a progressive and considerable enlargement dorsally above the wrists, in addition to the congenital hypertrophy of the extremities. In 1889 he lost strength, and had to give up work after domestic troubles. In January, 1890, he had an attack of

influenza and entered hospital. He died on May 29th. One month before death he was emaciated, with enormous bony extremities, left side of chest contracted, spine sclerotic without kyphosis. Head, lower jaw, tongue, and skin generally normal. Penis voluminous, testicles small. Slight bony enlargement at elbows; enormous bony enlargement dorsally above wrist, and of the upper ends of metacarpals below; between these points some thickening of the soft tissues, not affecting the skin, which is non-adherent. The wrist-joint is shown by a slight transverse furrow. The tendons of extensors and radials, which are clearly seen to contract, seem to float in the midst of semi-fluctuating masses of the same consistence as the fungosities of tubercular arthritis. Also a sensation as of extra-articular foreign bodies. Metacarpal region of normal dimensions. Fingers enormously enlarged and elongated, with huge drumstick ends and parrot-beak nails; enlargement entirely bony; interphalangeal joints slightly swollen. He has never had local pain or change in sensation or motility; but has profuse perspirations from the affected parts on doing delicate work. Lower limbs similarly affected, but with some thickening of soft tissues and a little œdema. Knees large; patellar reflexes normal.

After death.—No evidence of pulmonary tuberculosis; heart normal; extensive abdominal adhesions; large liver with granular surface, caused partly by fatty masses, partly by sago-grain amyloid bodies. Slight superficial erosions in left elbow, wrist, and knee, not affecting the bone. Inner end of right clavicle enlarged.

Ref. 'Rev. de Méd.,' 1891, p. 30. 'N. Montpelier Med. Suppl.,' 1893, ii, pp. 647—661. Lefebvre's Thesis, Case 18.

Apart from the congenital enlargement of the hands and feet, this was a typical case. The articular troubles may possibly have been tubercular.

Cases 23 to 33 inclusive are Bamberger's.

Case 23.—Man æt. 23. Bronchiectasis, abundant mucopurulent, putrid, stratified expectoration: recent lobar

pneumonia with left pleuritic effusion and pulmonary œdema. Clubbing of fingers and toes last nine years.

Post-mortem.—Regular thickening and cortical sclerosis of leg-bones anteriorly and below. Spongy substance, especially of epiphyses, increased in density.

Case 24. Man æt. 67. Probable pleurisy at age forty; dyspnœa ever since. Abundant expectoration for ten years, fœtid for eight years. Enlarged extremities eight years. Epileptiform fits one year ago. Right side of chest contracted, dull at base with diminished vesicular murmur and copious disseminated crepitations. Lower ends of radius, ulna, tibia, and fibula thickened, tibia sensitive; intermittent œdema of legs; clubbed fingers with ungual cyanosis.

Case 25. Man æt. 48. Left pleurisy eighteen years ago; an accident eleven years ago. Cough one year, especially on right lateral decubitus, expectoration stratified, purulent, putrid; the same time clubbing of fingers and toes, malleoli and wrists. All the long bones are sensitive. Cold causes spontaneous pains. Lower ends of radius and ulna thickened. Clubbed fingers and toes with curved nails. Recent painful enlargement of the left mammary gland.

Post-mortem. — Chronic and subacute tuberculosis of lungs, with fibrous peribronchitis and bronchiectasis on right side. Pleural adhesions. Dilated and hypertrophied right ventricle. Small colloid thyroid. Ossifying periostitis of femurs and bones of legs and forearms. Large metacarpals and phalanges (especially the distal) with surface alterations. Large but otherwise unaltered tarsal bones; superficial deposits on metatarsals; terminal phalanges also enlarged. (A minute description is given of the bone changes.)

Case 26.—Man æt. 25, with stratified, fœtid, abundant expectoration free from tubercle bacilli. Has had a cough for ten years, fœtid sputa for over four years. During the last four years enlargement of finger ends and malleoli, becoming considerable the last six months. Clubbing of fingers and toes, tenderness of lower third of femurs and

lower third of tibiæ, the latter being considerably enlarged. No certain modification of forearms. Well-marked, high dorsal, kypho-scoliosis with a laterally flattened thorax, copious râles, and feeble breath-sounds. Frequent feverish attacks. Slight cyanosis of face and fingers.

Case 27.—Man æt. 39. Left pleurisy in 1884, and again in 1888. In September sputa became very abundant and fœtid, and there were attacks of vertigo and sensations of heat and cold. Since November, 1889, lancinating pains in right knee, increased by movement; pains in the right instep, relieved by rest in bed; never any pains in fingers. In December, 1889, fever, frequent hæmoptysis, drumstick fingers and toes, painful thickening of malleoli.

Post-mortem.—Multiple gangrene of lungs; bronchiectasis; basic meningitis. Osteophytes on both femurs; terminal phalanges of fingers thickened; tibiæ thickened above internal malleoli.

Case 28.—Patient aged 17. Variola at nine years of age, which left him thin and pale. At age fifteen began to cough. A year later sputa became fœtid. Burning pains on pressure and on coughing, felt in bones from knees to toes. The last two months similar pains from wrists to fingers, and thickening of wrists with terminal phalanges. Lower ends of radius and ulna thickened; slight œdema of back of hand; drumstick fingers with somewhat cyanosed curved nails. Symptoms in lower limbs marked by œdema. Considerable albuminuria. Abundant, thick, greenish, viscid, fœtid expectoration without tubercle bacilli. Dulness at left base with abundant large râles; harsh inspiration and obscure expiration at the apex.

Case 29.—Man æt. 30. Cough from twelve to seventeen, and from nineteen to present time. The last two years more abundant expectoration, loss of flesh, night sweats. A year ago hæmoptysis. A month ago sputa frequently fœtid. The last two years constant pains in malleoli, tibiæ, knees, hands, elbows, and right shoulder, more marked at night and disappearing in bed. Also slight

swelling of dorsum of feet and of legs, disappearing at night. The pains are often lancinating or perforating; while at rest there is a sensation as of lead. Three years ago the patient noticed that his distal phalanges and malleoli were beginning to increase in size.

On examination.—Decided dulness of upper lobes of both lungs, with bronchial breathing and loud râles. Generalised catarrh. Abundant expectoration, muco-purulent, imperfectly stratified, scarcely fœtid, without tubercle bacilli. Clubbing of fingers and toes, tenderness of upper and lower ends of bones of forearm; decided tenderness of lower third of femur, patella, whole of tibia, with swelling of the lower part of tibia. Tenderness of middle portion of fibula. Extreme tenderness over sternum.

All the foregoing cases of Bamberger (Nos. 23 to 29) are regarded by him as essentially cases of bronchiectasis with fœtid secretion. He expressly notes the absence in all of tubercle bacilli. The remainder (Nos. 30 to 33) are attributed to heart disease, although in several there was also lung trouble.

Case 30.—Child æt. 7, with pulmonary stenosis, congenital cyanosis, and tubercular deposit in lung. Fingers clubbed with curved nails.

Post-mortem.—Lower half of tibiæ red and thickened, readily detached and covering osteophytes. Upper half of tibia and also femur free from change.

Case 31.—Man æt. 53, with aortic insufficiency and tuberculosis of lungs. Clubbing of fingers and toes with curved nails. Bones of lower third of forearm slightly thickened, not painful nor tender; no swelling of soft parts. These enlargements followed after many years' symptoms of phthisis.

Post-mortem.—Periosteal adhesion of lower part of tibia, with osteophytes underneath.

Case 32.—Man æt. 50.

Post-mortem.—Aortic insufficiency from warty and ulcerative endocarditis; fatty degeneration and dilatation of heart.

Right lung, apex adherent and pigmented; left pleura shows adhesions. Slight clubbing of fingers and toes. Both tibiæ and fibulæ thickened.

Case 33.—Man æt. 36. History of acute rheumatism. Moderate clubbing of fingers. No bony deformities noticeable during life, but tenderness of inner border and lateral surface of left radius.

Post-mortem.—Stenosis of ostium venosum; aortic insufficiency; endocarditis; lungs only show chronic congestion. Osteophytic deposit over left radius.

The preceding cases (Nos. 30 to 33) are only very briefly described. Bamberger insists upon the identity of the bone changes in heart and lung cases. The plates published with his article support this contention.

Ref. "Ueber Knochenveränderungen bei chronischen Lungen und Herzkrankheiten," 'Zeitschr. f. kl. Med.,' 1891, xviii, p. 193; Lefebvre's Thesis.

Case 34.—Freytag, 1891. Man æt. 48, admitted December 28th, 1890. In good health until January, 1890, when he had influenza followed by a chronic cough, which increased towards the end of the year, rendering him bedridden.

On admission.—Sputum stratified, fœtid, containing elastic fibres, but no tubercle bacilli. Signs of bronchiectasis. Clubbed fingers and toes, with characteristic nails. Died January 16th, 1891.

Post-mortem.—Large heart; bronchiectasis with putrid bronchitis and gangrene of lung; left base condensed and airless. Thickened periosteum on tibiæ and fibulæ, mostly below; bones unaltered excepting for periostitis ossificans. Carpus, metacarpus, tarsus, and metatarsus practically normal. A careful description is given of the lungs, one hand, and one foot.

Ref. 'Ueber die Trommelschlägelfinger und Knochenveränderungen bei chronischen Lungen und Herzkrankheiten,' Inaug. Diss., Bonn, 1891.

Case 35.—Orillard, 1892. Man æt. 56, admitted June 6th, 1891. Intemperate, but no syphilis, and in robust health

until fifteen months before admission. In 1870 he received a spent ball on the right tibia, but no great damage was done. Also had a fall on right elbow. In 1876 he had suppurative adenitis in right groin. Eight years ago an iron bedstead fell on his left leg, causing a complicated fracture followed by suppuration. He recovered after six months in hospital. Five years ago, after a purge, had an irritating rash of bullæ on face and body, lasting two hours; and ever since he has been subject to similar attacks without obvious cause.

Fifteen months ago the right side of his chest was crushed between two empty carts. He attributes all his present troubles to this accident, although next day he did not feel it. For eight months he has had a cough, hæmoptysis, loss of flesh and strength. For five months sharp pains at base of right lung. About the same time he noticed his finger ends enlarging.

On admission he had kypho-scoliosis with maximum at seventh or eighth dorsal vertebra, and right pleuritic effusion which proved to be serous. There was limitation of movement in right elbow, enormous hands, and characteristic finger ends and nails; knees slightly swollen and flexed, ends of toes clubbed; head and palate normal. There was pain along the sixth, seventh, and eighth intercostal nerves on right side. No paralysis, and general sensibility preserved in all its kinds. Special senses normal. Tingling and numbness in fingers; cramps in calf and thigh, especially at night, less frequent than two or three years ago. Occasional night sweats. Sensations of cold in hands and feet, sometimes when perspiring freely and hot all over. No lightning pains. Intellect and memory unaffected. Reflexes normal. Thyroid of normal volume. No bacilli in sputum, and the pleural fluid did not cause tuberculosis in a guinea-pig. During his stay there were attacks of urticaria, corresponding with diminished extensibility of elbows and increased swelling of finger ends.

After death (on October 3rd) there was found, in addition to considerable pleuritic effusion, a bony cavity in seventh dorsal vertebra, communicating with an abscess cavity in the remains of right lung, which was adherent. Pleura much

thickened. Cretaceous tubercles at top of left lung. Heart and kidneys normal, liver and spleen enlarged.

Ref. 'Rev. de Méd.,' 1892, p. 231, "Un cas d'Ostéo-arthropathie hypertrophiante pneumique."

The evidence of bony enlargement in this case is not very clear, but the knees and ends of fingers and toes were apparently typical.

Case 36.—Gillet, 1892. Boy æt. nearly 13. Repeated bronchitis since age four. Fingers deformed, and general growth arrested since age six.

On admission about 30 cm. shorter than average stature at his age. Features puffy-looking. Well-marked emphysematous chest and signs of bronchial dilatation. Drumstick fingers and toes with characteristic nails. Bony hypertrophy of lower ends of legs, all other parts of the skeleton being, if anything, small for his height. Thyroid apparently normal. Tendency to cold extremities, but no cyanosis or local asphyxia. Some albuminuria. Intelligence normal for his age.

Ref. 'Ann. de la Policlinique de Paris,' March, 1892, No. 3, p. 99, "Ostéo-arthropathie hypertrophiante pneumique de P. Marie chez l'enfant."

Case 38.—Packard, 1892. Man æt. 29. At age fifteen slight hacking cough and hæmoptysis followed by night sweats. About the same time noticed finger tips and nails becoming rounded. Age twenty-four "dysentery" for three months. For a year after this attack he ceased coughing, but at the end of this time the cough returned. Age twenty-eight another attack of "dysentery," and other attacks on and off since then. While bowels are loose expectoration ceases. He has frequent spells of rheumatoid pain in various joints, and at times his hands are stiff.

For seven or eight years after cough began he was stiff in all his joints whenever he attempted to move. The cough, clubbing of fingers, arching of back, and stiffness of joints were all noticed about the same time. Memory has been failing for five years. No headache. Vision normal. Slight prominence of lower jaw. Kyphosis with maximum at

seventh dorsal vertebra. Hair ill-developed on trunk. Evidences of old empyema on right side. Expectoration fœtid, without bacilli or elastic tissue. Hands characteristic, bones slightly enlarged above wrists. Clubbing of toe ends. Tibiæ large. Knees and other joints apparently normal.

Ref. 'Internat. Journ. Med. Sci.,' June, 1892, ciii, p. 657, "A Case of Acromegaly, and illustrations of two allied conditions."

This case is described by the reporter as Osteo-arthropathy.

Case 39.—Möbius, 1892. Man æt. 51. Pneumonia eight years previously, but apparently recovered completely. In November, 1891, a plate of iron weighing 1 cwt. fell on to fourth and fifth fingers of right hand. In December, 1891, taken ill with bad cough, profuse perspirations, and debility. After some weeks the sputum became fœtid, but the general health improved. In January, 1892, pains in right little finger and ulnar side of ring finger, which increased and went up to the elbow, disturbing his sleep. About a week previously the fingers were noticed to have swollen. In February the pains were better, but the hands became weaker and more useless, so that he sought medical advice.

On examination.—Thickening of right metacarpus, and bending with clubbing of little fingers. Paresis and atrophy of all muscles supplied by right ulnar nerve. Partial R. D. in corresponding region of hand, anæsthesia of little finger and ulnar side of ring finger and hand, curving of fourth and fifth fingers from paralysis of lumbricales, slight clubbing of first three fingers, decided clubbing of last two, whose ends were somewhat cyanotic, egg-shaped, with large strongly curved parrot-beak nails. In left hand finger ends slightly clubbed. Chest rigid on left side, with dulness, bronchial breathing, and rhonchi behind over base. Much fœtid expectoration. Cardiac dulness increased to left; no murmurs, but action feeble. Feet normal. No enlargement or pain in larger bones.

Ref. 'Münch. med. Wochenschrift,' xxxix, June, 1892, p. 23, "Zur Lehre von der Osteoarthropathie hypertrophiante pneumique." See p. 23 for remarks.

Case 40.—Schmidt, 1892. Woman æt. 48, who contracted syphilis at age twenty-five, and in her thirty-first year had "rheumatism" in several joints and in the loins. At age thirty-five severe head pains. At age forty-seven vague pains in all the limbs, and general debility, and a few months later had decided thickening of the joints of both hands and elbows, with slight disturbance of mobility. She also had a severe attack of pain with enlargement of the terminal phalanges of fingers and toes, while nails became curved. Two months later still there was slight œdema of left elbow-joint, evident swelling of peripheral ends of forearms and of wrists, and drumstick phalanges with longitudinally striated parrot-beak nails. The rest of the joints of fingers and hands were normal. Passive movements were painful. Toes were affected like fingers. Under Pot. Iodid. the joints became less swollen and less painful, and the finger ends less deformed. Later on in the same year the patient had an ulcerated tongue, which also yielded to Pot. Iod. There was no history of lung disease.

Ref. 'Münch. med. Wochenschrift,' xxxix, 1892, p. 36, "Ueber die Beziehung der Syphilis zur Ostéoarthropathie hypertrophiante pneumique."

This case is exceptional in the apparently syphilitic origin of the symptoms and the absence of lung disease. There is, however, no post-mortem examination on record.

Case 41.—Marina, 1893. Baker, æt. 63, not a heavy drinker or a smoker, with no history of syphilis, and quite well until April, 1892, when he had an attack of pneumonia. Some time after he noticed his hands becoming bigger, and felt shooting pains in them. *On examination,* slight cervico-dorsal scoliosis and slight atrophy of serrati and supra-spinati. Very little alteration of tarso-metatarsal joints; scarcely noticeable enlargement of knee-joints; inferior maxillæ not enlarged; no thickening of forearms; no affection of nervous system beyond slight hyperæmia of optic nerves, and no visual disease. Hands enlarged, especially across heads of metacarpals; fingers thick and wide, especially proximally, not elongated, finger tips hard, swollen (this is not noticeable in the figure), skin thick but

normal, nails transversely striated, not curved like a parrot's beak. Judging by the figure, the proximal joints of little and mid finger of left hand are swollen. There is stated to have been some diminution in size of hands under Potass. Iodid. The hands and nails do not seem quite typical.

Ref. 'Riforma Medica,' 1893, ninth year, vol. i, p. 806, "Osteoartropatie ipertrofiante pneumonica parziale ed Acromegalia."

Case 43.—Chrétien, 1893. Woman æt. 54. First pregnancy age twenty; child delivered at term, but died in a week. No other children and no miscarriages, and catamenia continued regular. Soon after, an attack of "rheumatism" in the lower limbs, not generalised, and lasting four months. Two later attacks, the last in July, 1891. Had lupus of the face at time of first rheumatic attack; cured in St. Louis Hospital. Never any other tubercular manifestation. Menopause at age fifty-one; repeated epistaxis during two years. The right hypochondrium began to swell and become painful, and cardiac action became increasingly violent and irregular, with much dyspnœa. Ankles became œdematous at night, then permanently; then the knees, then root of thighs, but never abdomen. About the same time had erysipelas of face followed by abscess, and pains in root of nails followed by clubbing. In 1891 treated as a cardiac case. Condition of extremities not noticed until February, 1892. She then had the appearance and signs of congenital syphilis, a prominent superior maxilla, cranial bones apparently normal, no lumbar curvature to the spine, enormous enlargement of finger ends and nails of characteristic kind, hyperidrosis of skin of hands, considerable thickening of lower ends of radius and ulna, pain and tenderness in elbows and shoulders, enlarged feet and ankles of the usual kind, hyperidrosis of feet, effusions in both knees with pain on pressure, slight local keratosis on legs, with dilated veins, and comparative absence of hairs on legs and arms. The cardiac area of dulness was increased to a considerable extent, with a very intense, regular, rough systolic murmur over whole præcordium, loudest at mid-sternum, also heard in axilla posteriorly near spine and

under clavicles, especially on left side, and not modified by position of patient. A second softer murmur was heard at cardiac apex; no vascular murmur on jugular pulse, and no hepatic pulse, but considerable distension of venous sinuses on coughing. The lungs appeared normal beyond a few mucous râles over right base. There was no coldness of extremities, but capillary venous twigs were visible over both trunk and limbs. The blood was normal. Liver large, firm, smooth but tender. Spleen enlarged. Urine showed traces of albumen, diminution of phosphates and urea, no lactic acid or sugar.

Patient was put on KI, but this caused violent dyspepsia. She had subacute articular crises in big joints, especially knees, usually yielding to salicylate and applications of laudanum. There were severe bone pains, increasing tenderness of stomach, and loss of strength and flesh. She died at the end of January, 1893.

Post-mortem.—Ascites; syphilitic visceral lesions in abdomen; chronic nephritis; pelvic peritonitis with adhesions and a puriform mass in front of the uterus; a few pleural adhesions on ribs and posteriorly, none at apex; right lung adherent at base to diaphragm and liver, with an abscess cavity with caseous matter. Atheroma in aorta. No explanation of murmurs in heart.

Ref. 'Rev. de Méd.,' 1893, p. 326, "Un cas d'Ostéo-arthropathie hypertrophiante chez une syphilitique."

Case 49.—Thorburn, 1893. Man aged 21. Admitted December 14th, 1892. Five years previously had bursitis in front of right knee. Shortly after, weakness and increasing curvature of back, followed by abscesses in right groin and loin. Enlargement of hands and feet noticed by patient in autumn of 1891.

On admission.—Dorso-lumbar caries, with signs of phthisis. Face, head, neck, tongue, and lips normal. Thyroid small. Enormous hands, enlargement beginning three inches above wrist, affecting all diameters. Normal outlines obscured as in white swelling. Bones greatly enlarged. Normal prominences thickened and obscured. Line of wrist-joint ill-marked. Metacarpal region broad and thickened, especially

dorsally. Digits still more enlarged, with distinct prominences at interphalangeal joints, especially proximal ones. Bulbous terminal phalanges. Nails in good proportion, wide, a little short, not markedly striated, not curving over finger ends. Deformity of digits, chiefly bony. No œdema; skin normal but thick. Feet analogous to hands. Swelling beginning five inches above ankle-joint. Knees enlarged and sometimes painful. Some effusion and pulpy thickening of synovial membrane. Never any pain or tenderness of hands or feet.

The case died in September, 1895, and the results of the *post-mortem* examination by Westmacott were communicated to the Pathological Society by Mr. Thorburn on May 19th, 1896.

The lungs, spine, right supra-renal body, and right tibia, showed tuberculous lesions. The viscera showed extensive amyloid change. The skull was much thickened, rough internally, sclerosed, and devoid of diploë. In the facial bones, ribs, sternum, vertebræ (excepting the carious region), and clavicles no changes were observed. The limb bones were covered with a rough porous layer of subperiosteal bone. Their compact layer was sclerosed, and the medullary cavity encroached upon by new bone. These osseous deposits were especially well-marked in the shafts of the bones and the attachment of muscles and fasciæ. The shoulder-joints contained excess of clear fluid, the cartilages being eroded, but the synovial membranes normal. In the hip-joints closely analogous appearances were observed, and the hips and shoulders were remarkably symmetrical in the extent and distribution of their erosions. In the elbow and knee-joints symmetrical erosions were found with thickened synovial membranes, and less fluid than in hips and shoulders. Erosions of cartilage, principally marginal, were also found in wrists, ankles, radio-ulnar, carpal, tarsal, and other small joints.

Ref. 'Brit. Med. Journ.,' 1893, i, p. 1155, "Three Cases of Hypertrophic Pulmonary Osteo-arthropathy;" and 'Path. Soc. Trans.' for 1896; also 'Brit. Med. Journ.' (Annual Meeting of 1896).

The nails in this case were not typical, and there seems

to have been rather more thickening of soft tissues in upper limb that is usual.

Case 50.—Thorburn, 1893. Man æt. 38, admitted December 30th, 1892. Symptoms of phthisis in March, 1889. Ankles swollen the same year, especially in damp weather and after walking. Finger clubbing noticed twelve months before admission; variable. Wrists enlarged two months before admission.

On admission.—Signs of advanced phthisis. Hands with lower ends of forearms symmetrically enlarged; hypertrophy chiefly bony; metacarpal region little affected; interphalangeal joints enlarged; terminal phalanges clubbed; nails large, curved both ways. Over outer tendons on posterior aspect of both wrists is a diffused elastic swelling, as if from slight tenosynovitis. Whole forearm large; rest of limb wasted. Feet and lower ends of leg similarly enlarged, natural hollows being filled up. No œdema. Skin normal. Some fluid in knee-joints, and enlargement of lower ends of femurs. Slight pains in knees, ankles, and wrists. Slight general kyphosis of spine, without angular curvature. Head normal.

Ref. 'Brit. Med. Journ.' as above.

Thorburn's third case (No. 51) appears to me not to be typical. The next case is referred to by Thorburn in a note.

Case 52.—Thorburn, 1893. Post-mortem examination of a boy. The lower ends of tibiæ, fibulæ, radii, and ulnæ were found thickened, with ordinary clubbing of fingers, mitral stenosis, but no lung disease.

Ref. ibid.

Case 53.—Field, 1893. A boy, born December 4th, 1891; admitted May 24th, 1893. A very healthy child, and grew quickly, becoming very fat. In June, 1892, required larger boots and shoes than most children of the same age, but feet were not considered very large in proportion to his general size. In August, 1892, had whooping-cough and bronchitis severely, and had been subject to bronchitis ever since. From that date had steadily wasted, but hands and feet had been growing larger and larger.

On admission.—Left inguinal hernia and phimosis. Emaciation, especially of thighs and arms. Lower part of face greatly developed; both lips large and loose, and partly everted, especially the lower one. Malar bones prominent. Pinna 2⅛ inches long, nose not enlarged. Thyroid not enlarged. Heart-sounds normal. Bronchial râles at bases. Upper limbs very thin to just above wrist. Hands with lower articular ends of radius and ulna very large, bones large, tissues full, firm, and healthy-looking, unlike the rest of the limb. Nails slightly curved in both directions. Thighs emaciated. Knees enlarged like strumous joint, but not painful nor stiff. Feet, and to less extent ankles, much enlarged like hands.

Ref. 'Brit. Med. Journ.,' 1893, ii, p. 14, "Acromegaly and Hypertrophic Pulmonary Osteo-arthropathy."

This is the earliest case on record. The enlargement of face and ears is unusual, and reminds one of acromegaly (compare Cases 36, 60). The case is regarded by Arnold as acromegaly, by Sternberg as osteo-arthropathy.

Case 54.—Kerr, 1893. Man æt. 22, in good health until February, 1893, when he had right pleuro-pneumonia, followed by "abscess of the lung." He slowly recovered, and six weeks before admission began to have aching pains in knees and ankles; his wrists and ankles rapidly enlarged (in three weeks), since which he has had to wear larger boots and gloves.

On admission (October 17th, 1893).—Well nourished, but has lost weight. Tip of nose a little congested and cold-looking. No headache or affection of sight. Thyroid distinct. Neck and larynx not enlarged. Sensation and mental faculties unaffected. No fever. Urine normal. Clavicles and bony thorax unaltered, but distinct lordosis in dorso-lumbar region. No retro-sternal dulness. Heart displaced a trifle down and to right with epigastric pulsation. No accentuation of pulmonary second sound. Dulness, increased resistance, diminished vocal fremitus, vocal resonance and breath-sounds over lower third of right lung. Slight hacking cough. Muco-purulent expectoration without bacilli. Lower two thirds of radius and ulna evenly and smoothly

enlarged up to ends. Wrist-joints loose and crackling, but not distended. Carpal bones not much thickened. Fingers spindle-shaped, with enlarged joints, and bulbous, over-extended ends, and very large, thin, much curved, smooth, deep pink nails. Soft parts over upper limbs slightly thickened. Skin thin, elastic, and smooth. No œdema. Frequent perspirations. Fists cannot quite be clenched. Knees enlarged from bony overgrowth, and crackling. Ankle-bones enlarged.

Ref. 'Brit. Med. Journ.,' 1893, ii, p. 1215, "Pulmonary Hypertrophic Osteo-arthropathy."

Case 57.—Demons and Binaud, 1894. Man æt. 35, admitted April 10th, 1893. Nine years previously had a knife-cut in right thorax, which never quite healed. In 1891 acute purulent pleurisy. First manifestations of osteopathy nine or ten months after this. These lesions went on progressing chronically, notwithstanding the cure of the pleurisy and the closure of the wound. No hæmoptysis followed his stab, and no enlargement of the side, dyspnœa, or expectoration, but he was ill one month, and in violent expiration air came out at the wound. Two months later it healed up, but it opened again and discharged a little matter during an attack of dysentery at Haiphong, and at various times since then.

On admission.—Dorsal kyphosis with left dorsal scoliosis and partial collapse of right lung; no tubercle bacilli in sputum. Heart unaffected beyond accentuation of pulmonary second sound. Hands, nails, and lower parts of forearms showed characteristic enlargements; outer ends of clavicles also enlarged. Lower extremities affected like upper. Knees enlarged.

Treated with subcutaneous injections of pulmonary extract. General improvement; closure of fistula; movements improved; bones and joints unaltered.

Ref. 'Arch. gén. de Méd.,' 1894, vol. ii, pp. 129—147, "Sur un cas d'Ostéo-arthropathie hypertrophiante pneumique traité par des injections de liquide pneumique."

Case 59.—Springthorpe, 1895. Man æt. 21, admitted January 23rd, 1893. Neurotic family history. Always

strong and well until, at age ten, he had right pleurisy with effusion, followed by "typhoid fever." Very seriously ill for three months. Was then put into plaster of Paris for spinal curvature. At that time had ichthyosis. The last two years had transient swelling of feet, and the last six months swelling of the stomach.

On admission.—Dyspnœa, pain and swelling in legs and stomach, weakness and cough. Face swollen; ascites; enlarged liver and heart. Right chest much flattened and retracted; corresponding dorsal curvature, and sternum displaced upwards and to left, head to the right. Upper arms wasted. Lower ends of radius and ulna enlarged. Fingers lengthened and clubbed. In lower limb some ichthyosis, and œdema of legs and thighs. Knees enlarged, as also ankles and big toes. Died a few days after admission.

Post-mortem.—Right lung collapsed, left lung engorged, friable and small. Right empyema. Pericardium adherent; heart large, flabby, and dilated, without valvular disease or congenital deformity. Thymus absent. Liver probably lardaceous. Spleen large, fibroid, and probably lardaceous. Kidneys pale. Pituitary gland not enlarged. The kyphosis was the result of the empyema.

Ref. 'Brit. Med. Journ.,' 1895, vol. i, p. 1257, "A Clinical Lecture on a Case of Hypertrophic Pulmonary Osteo-arthropathy."

Case 60.—Davis, 1895. Boy æt. 4½ years, who had pneumonia at age one, and since then has never been free from cough, with frequent and copious expectoration. One year after the pneumonia, his fingers and toes, wrists and ankles, enlarged. Jaws were unaffected, lower lip somewhat hypertrophied, spine straight. There was copious effusion, probably purulent, into left pleural cavity. Wrists considerably thickened, but their movements unaffected. Metacarpals normal, first phalanges much enlarged, and terminals enormous and characteristically broadened and thickened, with parrot nails.

Similar changes in feet. Lower ends of femurs much enlarged, but no fluid in knee-joints. No joint tenderness.

Ref. 'Journ. Amer. Med. Assoc.,' June 1st, 1895. 'Brit. Med. Journ. Epit.,' October 12th, 1895.

Case 61.—Thayer, 1896. Married woman æt. 28. Admitted July 12th, 1892. Caught cold fifteen weeks before admission. Six weeks before admission noticed ankles getting thicker, and this has continued. Some pain in legs on walking.

On admission.—Signs of left pleuritic effusion, which cleared up in nine days. Finger tips clubbed with incurved nails. Lower third of tibiæ enlarged, especially at level of malleoli. No œdema or marked glandular enlargement. Face expressionless, otherwise unaltered. Urine normal. No tubercle bacilli in sputum.

Ref. 'New York Med. Journ.,' January 11th, 1896. "Hypertrophic Pulmonary Osteo-arthropathy and Acromegaly."

Case 62.—Thayer, 1896. Man æt. 20, seen March 13th, 1893. Seven weeks before, after exposure to weather, caught a chill followed by fever and a severe cough. In bed three weeks, with (it was stated) pneumonia. Since then intermittent chills, fever, and sweating, with occasional pain in right chest.

On examination.—Right pleural effusion, probably purulent. Would not come in. Two years later, March 18th, 1895, applied for admission. History of persistent cough since first attack, with copious expectoration in paroxysms, and recently copious hæmoptysis. Spine noticed to be crooked last nine months. Last six months could not lace his boots, and noticed increase in size of wrists and ankles. For four months has had pain in knees on kneeling. For two months has been unable to grasp small objects firmly. Never any pain in hands or feet. His mother has told him that his hands were enlarged ever since he was a child, but that he never had any difficulty in getting stockings or shoes to fit him.

On examination.—A tall man, with very marked contraction of right side of chest, slight scoliosis, contracted lung, and much-thickened pleura (confirmed by puncture).

Sputum tenacious, containing blood but no tubercle bacilli. Heart displaced, with a systolic murmur over aortic area. Blood nearly normal (Hb 48 per cent.). Urine 1020, trace of albumen, a few granular and hyaline casts, and crystals of calcium oxalate. Face unaltered. Enormous hands, with considerable expansion above wrists ; carpus unchanged, metacarpus thickened, especially distally ; fingers long and massive, with markedly clubbed hyperextended ends, and large, smooth, much-curved nails. Arms not muscular. Humerus normal. Lower third of tibiæ enlarged and massive ; tarsus unaffected, metatarsus partly enlarged, toes somewhat massive and slightly clubbed ; lower end of femora thickened.

Under observation eight months, during which there was steady increase of bony enlargement in and near hands and feet ; temporary effusion into knee-joints ; enlargement of sternal ends of clavicles, and thickening of right median cephalic vein.

Ref. loc. cit.

Case 63.—Thayer, 1896. Man aged 31, admitted September 27th, 1895. In good health until January, 1890, when laid up with pneumonia followed by pleurisy. A few weeks later suddenly brought up rotten-egg pus, said to be from an abscess in left lung. For two years after was in good health. In October, 1892, laid up with weakness and another attack of profuse expectoration. Next year went into the country to recruit. Cough persisted, but after repeated examinations no tubercle bacilli have been found. During the summer of 1894 noticed from time to time stiffness in knee and chilly sensations in calves of legs. In October or November, 1894, began to notice enlargement of insteps ; in December enlargement of finger ends ; in January, 1895, enlargement of wrists, associated with considerable dull pain, worse on movement. This pain ceased after two months. At the same time he noticed painless increase in size of ankles. In June, 1895, knuckles were first noticed to be enlarged. Since then has had no pain except in knees, which are very large. *On admission.*—Contraction of left side of chest with râles and dulness at base, lateral

curvature, enlargement of lower end of femur, heads of tibiæ, ankles, and adjacent bones, also of those near wrists, effusion into knee-joints, long clubbed toes, clubbed finger tips, enlarged interphalangeal joints, large much-curved nails.

Ref. loc. cit.

These three cases are very fully reported, together with a fourth case of ordinary acromegaly. Numerous measures and good illustrations are also given.

Case 64.—Walters, 1896.

Ref. 'Brit. Med. Journ.,' February 8th, 1896. 'St. Thomas's Hospital Reports,' vol. xxiv.

Class II.—Cases in which only the ends of fingers and toes were involved. Nos. 1, 15, 20, 21, 37, 44—48, 65, 66.

Case 1.—M. Bailly, 1862. Described as Hippocratic fingers. Male æt. 21. Glandular scrofula age eight; pleurisy age nine, becoming purulent and leaving a fistula, which remained open for ten years. A little cough with purulent expectoration lasted the whole time, and had never completely ceased at age twenty-one. During the year following his pleurisy, his finger and toe ends began to swell. Enormous enlargement of terminal segments, with large strongly curved nails, raised at roots by semi-fluctuating mass. Skin of pulp rose or bluish in colour, not tense. No œdema. No evidence of bony enlargement.

Ref. "Recherches à l'occasion d'un fait de doigt Hippocratique," 'Comptes Rendus de la Soc. de Biol.,' 1862, t. 4, ser. 3, p. 48. Case 1 of Lefebvre.

Case 15.—Moussous, 1890. Girl æt. 14, suffering from left empyema. Antiseptic injections of corrosive sublimate on three occasions, with a month's interval. Amelioration and cure after production of pneumothorax. Pulmonary tuberculosis of the same side without grave symptoms. A few days after the empyema began, the finger ends became large and red, and nails very large and much curved in both directions. The finger condition increased *pari passu* with the pleural trouble, and diminished with the diminution of

discharge. Apparently no change in tuberculosis of lung. Finger ends lost their redness.

Ref. "Du traitement de la pleurésie purulente par les injections intra-pleurales de sublimé," 'Journ. de Méd. de Bordeaux,' Oct., 1890, Nos. 10 and 11. Case 15 of Lefebvre; Case 3 of Jamet.

Case 20.—Chauffard, 1891. Man æt. 30. In October, 1882, pleurisy, which became purulent after three serous tappings. Esslander's operation performed; obliteration of pleural cavity and complete occlusion in November, 1883. After the operation enlargement of finger ends. In 1888, after an effort, a pleural fistula formed. In May, 1890, entered hospital with diarrhœa and loss of strength. Ends of fingers and toes enlarged, and the former hyperextended. Large doubly-curved nails. Alcoholic tremors of fingers. Large liver. Copious albuminuria. Heart apparently normal. Slight sensation of heat in feet, worse in evening. Shivering. Night sweats.

Ref. Lefebvre's Thesis, Case 14; Jamet's Thesis, Case 6.

Case 21.—Marie, 1891. Man æt. 51. Family history of phthisis. Alcoholism. Good health until three years previously, but slight cough for twenty years. In 1873 three abscesses in thoracic wall, one at level of spine of scapula, another at right breast, a third in axilla. The last still open. In 1876 two more abscesses in groin. Abundant expectoration last eighteen months. Suddenly felt much weaker, so entered hospital. Chest condition regarded by Marie as bronchial dilatation. Swollen hyperextended finger ends. Very large watch-glass nails, with long raised roots, longitudinally striated and readily split.

Ref. Lefebvre's Thesis, Case 16.

Case 37.—H. Gillett, 1892. Girl æt. 7¼. In February, 1891, quinsy. In June, bronchitis and pleurisy. In July, empyema, diarrhœa, vomicæ, pulmonary tuberculosis. Bony enlargements of finger ends, with curved nails and a similar condition in toes, noticed in August; noticed "for some time past" by the mother. January, 1892, great improvement

and less deformity. Attack of influenza. February, 1892, deformities nearly gone. Still signs of pulmonary tuberculosis, but no pus in pleura, and great improvement in general health.

Ref. "Ostéo-arthropathie hypertrophiante pneumique de P. Marie chez l'enfant," 'Ann. de la Policlinique de Paris,' March, 1892, No. 3. Jamet's Thesis, Case 5.

Case 44.—M. Moizard, 1893. Boy æt. 6. Seen on January 15th, 1893, suffering from right basic pleuro-pneumonia. On April 20th fever and vomica; still signs of pleurisy; well-marked clubbing of finger ends, with large, friable, pink watch-glass nails.

Ref. "Deux observations d'ostéo-arthropathie hypertrophiante pneumique, dans le cours de pleurésies purulentes, chez des enfants; forme aigue et curable," 'Bull. et Mém. de la Soc. Méd. des Hôp. de Paris,' 3 S., tome x, May, 1893, pp. 359—365. Jamet's Thesis, Case 2.

Case 45.—Moizard, 1893. Girl æt. 5. In December, 1892, had left pneumonia, from which she seemed to completely recover. Soon after this, clubbing of fingers was noticed. In February, 1893, dyspnœa; pus found in pleura, containing pneumococci and a few streptococci. Finger ends large and pink, with large watch-glass nails. Slight affection of big toe-nails. Improvement of the finger ends with the cure of the empyema.

Ref. 'Bull. et Mém. de la Soc. Méd. des Hôp. de Paris,' 3 S., tome x, May, 1893, pp. 359—365. Jamet's Thesis, Case 1.

Case 46.—Marfan, 1893. Child with empyema cured by pleurotomy.

Ref. preceding case ('Bull. et Mém. de la Soc. Méd. des Hôp.').

Case 47.—Marfan, 1893. Child with bronchial dilatation.

Ref. preceding case.

Case 48.—Marfan, 1893. Child with cystitis and right pyelonephritis, which followed after catheterism during

typhoid fever. *Bacterium coli commune* found in the urine. The cystitis was cured by borax, but there were several returns. No affection of respiratory passages or vascular apparatus. During the month previous to report, characteristic finger ends and nails developed.

Ref. preceding case.

Case 65.—Man æt. 36, under Dr. Hillier, admitted in November, 1892, with empyema. Operated upon successfully. A year later, "rheumatic" swellings of knees, ankles, and small joints of hands. In 1894 clubbing of finger ends, probably partly bony, with huge much-curved nails. (Unpublished.)

Case 66.—Man æt. 55, under Dr. Pidcock. History of pneumonia and influenza. Very chronic phthisis, mainly of one side, with thickened pleura. Finger ends characteristic in appearance, but no evidence of bony change. (Unpublished.)

Class III. Cases which are doubtful or insufficiently described.—Nos. 2—6, 11, 14, 42, 51, 55, 56, 58, 67.

Case 2.—Friedreich and Erb, 1867 and 1888. Man æt. 18, previously in good health, noticed that his feet were getting larger, and soon after his legs and knees. Also had slight fatigue in walking. About two years later his hands began to grow, so that work became for a time impossible. There was a sense of tension, but no pain. At age twenty-six he had wide-spread bony enlargements affecting the usual situations in upper and lower limbs, also sternum, ribs, scapulæ, clavicles, crests of ilia, spines of lower cervical and upper dorsal vertebræ, alveolar and maxillary processes of malar and palate bones, hyoid bone, but not the cranial vault. The cartilages of ears, eyelids, and epiglottis were enlarged, nails enormous, skin of hands and feet slightly thickened, muscles flaccid and ill-nourished. Special senses and intellect unaffected. Twenty years later he had chronic bronchitis and articular rheumatism of right wrist and feet. Twenty-six years later the alveolar process of upper maxilla was thickened, the lower jaw unaffected; spine kyphotic;

eyelids hypertrophied; tongue not enlarged; joints freely moveable, without effusion or periarticular thickening. Sight slightly affected, but fundi normal. A year after this he died.

Post-mortem.—The hypophysis cerebri and sella turcica were found not enlarged. The bony enlargements in hands diminished progressively towards the periphery. There were extensive visceral changes, including adherent pleuræ and pericardium, broncho-pneumonia, emphysema, myocarditis, and chronic interstitial nephritis; the brain was normal; there was hyperplasia of fibrous elements around the peripheral nerves, vagi, and sympathetics, and endoarteritis obliterans of the small arteries and veins of muscles, nerves, and skin. The skin was thickened in both derma and epidermis, the walls of sudiparous glands thickened, with increase of connective tissue in derma, subcutaneous tissue, and muscles.

Ref. N. Friedreich, 'Vers. deutscher Naturforscher und Aerzte zu Frankfort,' September, 1867, "Hyperostose des gesammten Skelets." Friedreich, 'Virch. Arch.,' xliii, 1868, p. 83. W. Erb, 'Deutsches Archiv für klinische Medicin,' 1888, xlii, 4, p. 295, "Ueber Akromegalie." W. Erb, 'Vers. deut. Naturf. und Aerzte zu Heidelberg,' Sept., 1889. J. Arnold (for post-mortem examinations), 'Ziegler's Beiträge zur pathol. Anat. und allg. Pathologie,' 1891, x, p. 1. Lefebvre's Thesis, Case 2.

This much-disputed case is regarded as Acromegaly by Arnold, Erb, and Virchow, but claimed as Osteo-arthropathy by Marie and the French school (see p. 14).

Case 3.—Friedreich and Erb, 1867 and 1888. A younger brother of the preceding who had a similar history, the changes beginning at age seventeen while he was in perfect health. The deformities became even more marked, but health and strength remained better than in his brother's case. The maxillæ and spine were unaffected. Genitals not enlarged. No post-mortem has yet been published.

Ref. Friedreich and Erb, loc. cit. Lefebvre's Thesis, Case 3.

Probably belongs to the same class as Case 2.

Case 4.—Smirnoff, 1888. Man æt. 23, the subject of hereditary syphilis, but without pleuro-pulmonary disease. Deformity of the hands began at age nine. Three or four years before admission he had a gumma of the hard and soft palate, which cicatrised under the influence of KI and calomel. When seen, the four fingers in each hand were bent and ankylosed at interphalangeal joints, the last phalanges of all fingers and toes flat, broad, and rounded, the former with very broad, big nails. The joints of elbows, hands, feet, and knees were very large and deformed, the diaphyses of forearms, thighs, and leg bones much elongated; these and the diaphyses, carpus, and tarsus also hypertrophied. Face flattened from above with prominent malars.

Ref. 'Monatsheft für praktische Dermatologie,' 1888, vii, p. 1, "Ein seltener Fall von ausgebreiteter symmetrischen Verunstaltung auf grund hereditärer Syphilis."

Probably not osteo-arthropathy, but bone and joint lesions of hereditary syphilis.

Case 5.—Elliott, 1888. Man aged 27, in good health until sixteen months before admission, when be began to feel pains in knees and shoulders. Six months before admission his hands and feet were found to be enlarged.

On admission.—There was œdema from finger ends to halfway up humerus, enlargement of phalanges, metacarpal bones, radius, and ulna, swelling from toes to knees, with enlarged bones and knee-joints; clavicles and some of the ribs thickened on one side of the body; head and jaw unaffected. Effusion in right pleura; multiple nodules on skin regarded as sarcomatous. He died nine months after the bony enlargement had been noticed.

Ref. 'Lancet,' 1888, i, p. 170, "Multiple Sarcoma associated with Osteitis Deformans." Lefebvre's Thesis, Case 5.

This case was, I think, neither Osteitis Deformans nor Acromegaly. Lefebvre regards it as Osteo-arthropathy, but this appears to me not proven.

Case 6.—Fraentzel, 1888. Man æt. 58, admitted in a late stage of pulmonary phthisis, which seems to have begun

at age twenty. Already in infancy his extremities were enormous, and his hands were of such a size that he was obliged to become a wheelwright. No relative (except one of his two daughters) was affected in this way. He was addicted nearly all his life to alcoholism and polydipsia, so that while in hospital he drank several litres of water a day in addition to his allowance of alcohol. No albuminuria or glycosuria.

On admission.—Large nose and maxillæ, lips like pads, cheeks like pouches, ears normal, uvula and adjacent parts large and cyanotic, soft parts of the head much thickened; the lower part of the forearm notably thickened, wrist very big, hands shapeless, soft parts in both fingers and palmar region strongly swollen and notably pasty to touch; fingers and especially nails colossal; feet similarly altered; articulations notably enlarged and thickened, metatarsals and toes attracting attention by their size. Slight kypho-scoliosis, and decided prominence of the sternum.

Post-mortem examination by Langerhans showed that the pituitary body was not enlarged; cranial vault thickened with adherent dura mater; tongue rather large; thyroid not developed; heart enlarged and dilated with adherent pericardium.

The *daughter* at age eleven was a healthy girl, with enlargement of hands and feet and adjoining parts of limbs.

Ref. Fräntzel, 'Deutsche med. Woschenschrift,' 1888, xiv, p. 651. Virchow, ibid., 1889, xv, p. 73. "Vorstellung eines Falles und eines Skelets von Akromegalie," Virchow, 'Berl. klin. Wochenschrift,' 1889, xxvi, p. 81. Virchow, "Lect. on Acromegaly," trans. by Kanthack, 'Ill. Med. News,' 1889, ii, p. 241 (plate). Lefebvre's Thesis, Case 6.

Another disputed case, regarded by the German school as Acromegaly, and by the French as Osteo-arthropathy. (See p. 14.)

Case 11.—Gouraud-Marie, 1889. A man of 50, applied for the relief of a trifling congestion at the base of one lung, which was well in a few days. He had large hands, the enlargement affecting especially the wrist and fingers, the phalanges cylindrical, the middle relatively more enlarged

than the proximal, and the terminal segment of the finger most of all, with well-marked parrot-beak nails and drumstick finger ends. There was characteristic bony enlargement near wrist and elbow, and corresponding changes in the lower limbs. Kypho-scoliosis with contraction chiefly of the left side of the chest, said to date back five or six years. No enlargement of cranial vault, or of facial bones, excepting a thickening of alveolar border of superior maxilla. No alteration of tongue, lips, ears, or external genitals. No effusion in any joint, but several show limitation of movement and cracklings on passive motion. No affection of sight. On inquiry there appeared to be no family tendency to similar deformities; he had "always been as he was," and had never been ill excepting an attack twelve years previously of intermittent fever. He was refused for military service on account of his big feet.

Ref. 'Bull. de la Soc. Méd. des Hôp.,' 1889, Nos. 15, 21. 'Rev. de Méd.,' 1890, p. 1, "De l'Ostéo-arthropathie hypertrophiante pneumique." Lefebvre's Thesis, Case 9.

A case with the appearance of Osteo-arthropathy, but without any history of chest disease to account for it, unless the "intermittent fever" was empyema. This, Marie's original case, was first regarded by him as Acromegaly, but subsequently withdrawn from that group.

Case 14.—Renner, 1890. Man æt. 45; relatives free from deformities. No history of syphilis. Had typhus during the war of 1870, and since then has been subject to attacks of diarrhœa. Illness began two and a half years ago with lassitude, pains in abdomen radiating to genitals, fissures of the tongue, moderate dyspnœa and functional dysphagia; one and a quarter years ago, pains in hands and feet, followed by enlargement. The dysphagia varied inversely with the swelling of extremities. For some time past has had giddiness and headache every morning, and can do no heavy work owing to weakness and difficulty in walking. Hair has become dry and brittle. Sexual functions lost.

On examination.—Pigmentation of face and hands. Skull, jaws, tongue, sight, smell and taste, and intellect apparently unaltered, but ears thickened in places, some deafness, and

voice somewhat altered. Bony enlargement of hands and feet with adjoining parts of forearm and leg, also near elbows, knees, iliac crests, collar-bones, ribs, acromion and spines of scapulæ, ensiform process, and dorso-lumbar spinous processes. Movements of hands and fingers clumsy and restricted. Skin generally normal, excepting over parts of hands and feet, where it is thickened. Some clubbing of fingers and toes, but apparently no elongation. Pulse, urine, and viscera of chest and abdomen apparently normal.

Ref. 'Ver. bl. der pfälzischen Aerzte,' August, 1890, No. 8, p. 164.

Arnold regards this as a case of "secondary ostitis." It appears to me to belong to the "intermediate group," as the enlargement was primary, the tongue was fissured although not enlarged, and the cartilages of ears and perhaps also of larynx thickened; while, on the other hand, the clubbed fingers and bony enlargement near joints remind one of osteo-arthropathy.

Case 42. — Stembo, 1893. Woman æt. 56, who was subject to chronic bronchitis, and six years before admission had pneumonia, followed by pains in the joints of hands and feet, tingling in finger ends, and also enlargement of hands and feet.

On admission.—Her malar bones were prominent; nose, ears, lips, lower jaw, parotid glands, tongue, and uvula, all enlarged; larynx and skull unaffected; no ocular symptoms, nor any head pains. Thyroid gland shrunken; lungs emphysematous; abdominal viscera apparently normal. Low lumbar kyphosis, projection of lower part of sternum and chest; thickened clavicles; hands hypertrophied, with clubbed finger ends and large curved split nails, wrist and lower part of forearm also enlarged. Similar deformities in feet and lower part of legs. Some other not specified joints are also affected.

Ref. 'St. Petersb. med. Wochenschrift,' 1893, No. 3, p. 21, "Ueber Osteo-arthropathie hypertrophiante pneumique." For a paper on the subject generally see Stembo, 'St. Petersb. med. Woch.,' 1894, xi, p. 383, "Ist die Osteo-arth. hypertro. pneumique eine Krankheit *sui generis?*"

Notwithstanding the description and name given to the case, the published illustration shows hands and feet more like Acromegaly than Osteo-arthropathy; and this is supported by the affection of many parts which usually escape in the latter disease. It is probably a variety of Acromegaly (see p. 14).

Case 51.—Thorburn, 1893. A policeman, æt. 30, who died of rapid phthisis, attributed to exposure to weather a few months previously. His feet and hands had always been large, but had gradually increased in size since his general growth had ceased. When seen there was bony enlargement of hands and feet and adjacent parts of the limbs.

Ref. 'Brit. Med. Journ.,' 1893, i, p. 1155.

This may have been either Osteo-arthropathy or Acromegaly. From the history the latter appears more probable.

Case 55.—Legrain, 1894. The urinary condition of this case was recorded in the 'Ann. des Malad. des Organes Genito-urinaires,' but owing to the courtesy of Dr. Legrain I am able to publish a complete record of the case, which will be found at page 68, together with an unpublished note on other cases met with by him in the Sahara. Legrain's case presented enlargements of extremities resembling those of ordinary Osteo-arthropathy, but which came on in early life (age nine) without apparent cause. The heart and lungs seem to have been sound; and there is distinct evidence of changes in the visual fields. For these reasons the case appears to me to belong to Acromegaly, or to the Hagner group.

Ref. 'Ann. des Mal. des Org. Genito-ur.,' Paris, 1894, xii, p. 109, "Notes sur la sécrétion urinaire d'un cas d'Ostéo-arthropathie hypertrophiante pneumique." Also these reports (p. 68).

Case 56.—Posmantir, 1894. Man æt. 21, admitted 17th May, 1890, for tumours in parotid region, weakness, and inability to use his hands. Family history unimportant. Patient had always been in good health. Age fourteen had tertian ague, which was cured, but returned last

summer. No history of syphilis, rheumatism, or alcoholism. During autumn of 1889 he noticed a growing tumour, of the size of a nut, in right parotid region, with obstruction of right nostril. After two months another appeared in left parotid region, which increased more slowly. At the same time his hands and feet were noticed by his companions to be getting larger, and his shoes began to be too small for him. Could work readily at mending sewing-machines until this year, when he could no longer grasp his tools or clench his fists; and getting weaker he entered hospital.

On admission.—Features expressionless, skin of face fine-textured; large hanging lower lip, small ears, sensitive to pressure; large and somewhat pointed nose. Respiration entirely buccal and noisy. Skull not enlarged; teeth meet; lower jaw not enlarged; jaws cannot be properly separated owing to tumours. That in right parotid region extends nearly down to clavicle, involving the vasculo-nervous bundle of the neck, the salivary glands, and a great part of the palatine vault. The left parotid tumour is much smaller. Thyroid body enlarged. Shoulder-joints normal. Elbow-joints stiff, but not swollen; complete extension is painful, but quiet passive movements are painless. The forearm is enlarged in its lower 6 or 7 cm., mainly from enlargement of the ulna, which gives it a deformed appearance. An exostosis, size of a nut, is felt on lower third of radius. The hand, although enlarged, is not as much so as the lower end of forearm. Palm more enlarged than dorsum. Palmar folds deep. Fingers seem long, and have drumstick appearance; terminal segments with large curved nails, like a parrot's head. These changes are best seen in the thumbs. Fist cannot be clenched; movements of hand are difficult. Muscles of thighs wasted. Knees swollen and a trifle stiff. Legs somewhat like forearms, and ungual phalanges of big toes enlarged with large nails. Patellar reflexes abolished. Skin of thorax has no large hairs. Nipple and areola swollen, of the size of a 5-fr. piece. False ribs of left side enlarged and prominent, causing unilateral deformity. Clavicles very much thickened, especially at outer ends. Sternum and scapulæ not enlarged. No spinal kyphosis

or lordosis, but the spinous processes are enlarged, especially in upper dorsal and lumbar regions. Sacrum large and prominent. Thoracic organs normal. No retro-sternal dulness of Erb. Genital organs little atrophied, excepting the left testicle, which is much wasted. Sensitiveness of skin abnormally great, touching an object causing pain. No zone of anæsthesia. Thermal and tactile senses preserved. Height 168 cm. Dynamometer—right hand 22, left hand 25. Very marked muscular wasting. Patient left the hospital, but re-entered some months later in a dying state.

Post-mortem (by Prof. Babech).—Carcinomatous tumours in parotid glands, involving base of skull. Pituitary body much enlarged. Beyond the skeleton little remarkable was found. Lungs were absolutely normal.

Ref. 'Spitalul,' Bucharest, 1894, No. 1, p. 8, "Un cas de Osteo-arthropathie hypertrophiante pneumique."

The enlargement of the pituitary body in this case is quite exceptional in Osteo-arthropathy. Possibly the case was one of Acromegaly or of hypertrophy of nervous origin.

Case 58.—Murray, 1895. Painter æt. 40, who at age of twenty-seven was said to be phthisical, and sent to South Africa. At age thirty-four the terminal phalanx of each thumb enlarged, and the nail became discoloured. Soon after, the terminal joint of left middle finger and the same joint of ring finger became enlarged and painful. Toes began to increase in size about the same time. When seen there was Dupuytren's contraction in the palm of each hand, connected with the ring finger on right and middle finger on left. The feet were enlarged, especially the metacarpo-phalangeal joint of left big toe.

Ref. 'Brit. Med. Journ.,' 1895, i, p. 293, "Clinical Remarks on Cases of Acromegaly and Osteo-arthropathy."

From the illustration given it appears that the nails are not convex, and the enlargement of thumbs is chiefly next the interphalangeal joints. The overgrowth of the right ring finger mainly affects the last joint, and the end of this phalanx is relatively small. The same is true of the left middle finger. The condition is not symmetrical. Seeing that all the changes may readily be explained as the result

of gout, and none of the usual characteristics of osteo-arthropathy are to be found in the illustration or description, it is somewhat surprising to read that the case has been judged by a very high authority to be a case of Osteo-arthropathy complicated with gout. I am unable to find the reasons for this decision.

Case 67.—Verstraeten, 1889. Marie appears to regard one of Verstraeten's two cases as Osteo-arthropathy. Souza-Leite regards one of these as undoubted Acromegaly, and the other as probably Acromegaly. I can find no reason for regarding either as Osteo-arthropathy.

Ref. 'Rev. de Méd.,' 1889, p. 377.

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A Case of Hypertrophic Osteo-arthropathy.

Together with a Note on similar cases observed in the Sahara, by Dr. E. Legrain, formerly Surgeon in the French Army (translated and published with the Author's sanction by F. R. Walters).[1]

Case 55.—Legrain, 1894. J. M—, æt. 29, born in a village of Morbihan, has followed since childhood the occu-

[1] Sent to the translator with the following note:—"Très-honoré Confrère,—Je réponds de suite à votre lettre et vous envoie l'histoire clinique du cas d'ostéo-arthropathie hypertrophiante qui a fait le sujet de mes recherches sur l'excrétion urinaire dans cette maladie. Ayant été longtemps détaché en garnison dans le Sahara, j'ai rencontré de nombreux cas d'ostéo-arth. hypert., qui sûrement

pation of basket-maker. Father died of congestion of the lungs, mother from an unknown cause. He has a brother and two sisters in good health. Nobody in his family has any deformities of fingers.

At two years of age he had scarlatina. Towards seven years his parents noticed that his fingers were peculiar. At nine years he had a violent fever for several days during an epidemic of smallpox. He had been well vaccinated when a few months old, and since then had been several times unsuccessfully re-vaccinated. After this fever his hair fell out, and his fingers greatly increased in size. Until age thirteen he had nocturnal incontinence of urine. From nineteen to twenty he appears to have had several attacks of polyuria, and a very large appetite. Entering the army in 1879, he got a chancre in 1890, treated for two months with mercury internally. Nevertheless during 1891 and 1892 he does not appear to have had any secondary symptoms, so that it is not certain that the chancre was syphilitic. Numerous warts on his hands were removed during his stay in the regiment. The polyphagia had necessitated the distribution of double rations. He has now (October, 1892) been in Algeria for one and a half years. He has occasionally had benign attacks which have rapidly yielded to Quin. Sulph. When the weather is changing he complains of neuralgic fugacious pains, which may be malarial. No alcoholism.

The osteo-arthropathy of hichw he is the subject came on insidiously, and has gone on increasing up to the present time. It is impossible to determine its commencement. From the age of nine his parents had noticed the abnormal shape of his hands, and especially the notable thickening of his distal phalanges ; and even now the patient notices that gloves and boots which fit him when they are new, become too tight after several months' wear. Military exercises have

n'étaient pas pneumiques d'origine. J'avais l'intention d'en faire une note, mais n'ayant pas le temps de poursuivre cette étude, je vous envoie un petit mot à ce sujet. Si vous faites un travail sur la question, je serais enchanté de voir que ces notes puissent vous servir, et vous autorise pleinement à en faire l'usage qu'il vous plaira. Agréez, très-honoré confrère, l'expression de mes sentiments les plus dévoués, Dr. E. Legrain, Médecin à Bougie (Algerie) ancien médecin de l'armée."

been slightly painful to him. Flexion of the knees and elevation of the arms were especially trying, and could not be completely performed. The patient had often been reprimanded for this. The hand movements necessary to load his gun were difficult because of the stiffness in the wrist-joint and metacarpo-phalangeal joint of the thumb. This functional difficulty, which was the cause of his being sent to the surgeon, does not appear to have attracted any special attention from other surgeons who examined him.

On admission he was well built ; his hands and feet at once attracted attention from the size of the phalanges. On examining more carefully it was found that his joints were distinctly enlarged. Height 1·635 metres (at the beginning of 1890 it was 1·63). Circumference of chest 91 cm. Skin dirty white, with little colour. While at rest it is dry and slightly scaly, pellicles of several square mm. being removable by the nail. As soon as he works or walks a little he perspires profusely. The hairs are little developed. On the posterior surface of the forearm one sees at most 3 per square cm. The hair of the head and the moustaches are blond. On the forearms the hairs can be readily pulled out without pain, and are then found to have atrophied bulbs. On the face the orifices of the sebaceous follicles are not specially dilated. The patient is not very sensitive to cold, nor has he burning sensations at night. He is often troubled with itching, and has formications in hands and feet. The muscles do not seem to be atrophied, but are too soft when contracted. This want of firmness contrasts strangely with their bulk, especially over the biceps brachii. No muscular tremors have been observed. Circumference, centre of left arm, 270 mm., right 260. The strength of the muscles does not correspond with their volume. The grasp of the hands is below the average. Nervous system : memory excellent ; intelligence good, but he never could master figures at college, although he attended up to age twenty. Sight : considerable contraction of visual field. Papillary vessels a little contracted. Slaty pigmentation of fundus. Commencing infero-external staphyloma in right eye.

Right eye { M. = 3·50 D. / V. = 2·5 } Left eye { As M. = 1·50. / V. = 1·25 (Bourget). }

Other sense organs normal. Sensibility normal; no tenderness on pressure over soft parts of limbs. Patellar reflexes abolished. Pupillary reflex present. Venereal desire far from being abolished.

Upper limb: circumduction painful and incomplete. Articular ends of humerus and ulna clearly hypertrophied at elbow. Circumference of left elbow 27·5, right 26·5. Complete extension is impossible; in forced extension the forearm makes with the upper arm an angle of 165°. Antero-posterior diameter of left elbow 70, right 68. Palpation shows distinct hypertrophy of the bones of the forearm. Circumference of forearm 7 cm. below elbow-joint is on left side 280, on right 275 mm. The greater size of the left upper limb cannot well be explained by the patient's occupation; as a matter of fact he used the right arm more than the left. The ends of both bones of the forearm are clearly thickened near the wrist-joint. Circumference of right wrist 188, left 185 mm. Antero-posterior diameter of right wrist 44, left 44. Transverse diameter across styloid processes 63. Movements of radio-carpal articulation have nothing like the normal amplitude, and are sometimes accompanied by crepitations. No pain on pressure nor on forced movement. In flexion and extension of the hand on the forearm the plane of the hand cannot be brought to a right angle with that of the forearm; it always makes an angle of at least 120°. The width of the hand from outer border of second metacarpal to the inner border of 5th is 100 mm. opposite middle of metacarpus. There is notable hypertrophy of heads of first and second metacarpals on both sides. Fingers are enlarged at joints; terminal phalanges notably hypertrophied. Volume of hands to 1 cm. above styloid process of ulna, on right is 460 c.c., on left 510. Circumference of hand at junction of two middle limbs of palmar M. is 222 on right, 220 on left. Thickness of each hand measured at level of metacarpo-phalangeal joint of index is 32 mm., which clearly shows the hypertrophy of the heads of metacarpals. Length of fingers is normal. Medius measures 110 mm. from metacarpo-phalangeal joint to tip. Generally speaking, the fingers are larger at their tips than at their roots.

	Right.	Left.
Terminal phalanx of thumb, width . .	30	30
,, ,, antero-posterior diameter .	21	21
,, ,, in circumference .	85	83
First phalanx of thumb, in circumference . .	70	70
Terminal phalanx of index ,, . .	62	65
,, ,, medius ,, . .	70	70
Nail width, thumb	29	23
,, medius	18	18

Movement of flexion of second phalanx of thumb on first is not as complete as it should be. Pressure on the phalanges or their articulations is not painful. Nails friable and readily split, always longitudinally. They are thin, very flexible, and can be readily curved by pressure on lateral borders.

Circumference of thorax 91 cm. Slight kyphosis. Circumference of neck 37 cm. Head and forehead well covered and retreating. Parietal eminences well developed. Ears small, with small lobules. Malar bones moderately prominent. Eyelids not thickened. Very slight thickening of ascending rami of inferior maxillæ. Teeth are separated by pretty wide intervals. They are friable and readily broken, and have small crowns. No deformity of palatal arch. Tongue normal. Clavicles and scapulæ thickened. No retro-sternal dulness. Heart and lungs normal. Larynx much developed, pomum Adami prominent.

Bicondyloid diameter of femur, 92. Circumference of knee at level of fold—left, 36; right, 37. Circumference of thigh at 15 cm. above knee-joint—left, 46; right, 48. Flexion of limb on the thigh is incomplete. Both malleoli project laterally beyond the tarsal region. Maximum circumference of big toe, 123. Bimalleolar diameter, 112. Nails as in hands.

Polydipsia, polyphagia, polyuria with increased frequency of micturition. For urinary changes see p. 9; also 'Ann. des Mal. des Org. Genito-ur., 1894, xii, p. 109.

Frequency of Hypertrophic Osteo-arthropathy in the Sahara.

Since my arrival in the oasis of the Sahara, I have been struck with the unusual frequency of hypertrophic osteo-

arthropathy ; and as tuberculosis is rare, I could not at first (1893) explain the pathogenesis of this complaint, which at that time was still regarded as almost exclusively pulmonary in origin.

Which are the tribes who are subject to hypertrophic osteo-arthropathy ? I have found it amongst Psourians of the Oued Rihr, Psourians of the Oued Souf, natives of Touat and Saharan Israelites. Having had opportunity to examine a certain number of Touaregs of the Adzjers and Hoggar divisions in 1892–3, I did not find among them any examples of the disease. Nor did I meet with it among the Chambos of El Oued, a nomad tribe, whose territory is to the west of Southern Tripoli. The disease seems, therefore, to be common in the Central Sahara and the northern part of the sandy Sahara. What, then, is the pathogenesis of the complaint ? Lefebvre has shown that the bones in osteo-arthropathy have an unusually large proportion of magnesia, with diminution of lime. Now in the whole of the sandy Sahara the drinking-water is exceptionally rich in magnesia. Possibly this may account for the disease ; and this conclusion is supported by a few experiments which I made on animals. However this may be, I had to amputate a leg in a native of the Souf for a complicated fracture caused by a disproportionately small injury ; and in the bones of the amputated limb I found the lesions of hypertrophic osteo-arthropathy (Military Hospital of the Oued Souf, 1893).

A CASE

OF

HYPERPLASTIC OSTEO-ARTHRITIS,

OR

PULMONARY HYPERTROPHIC OSTEO-ARTHROPATHY OF MARIE.

By F. R. WALTERS, M.D., M.R.C.P.

J. M—, an umbrella maker æt. 34, was admitted as an out-patient at the North London Hospital for Consumption on April 1st, 1895, complaining of cough with copious expectoration, pain in the back, and general weakness.

His *family history* reveals nothing remarkable. His father was living, over age seventy; his mother died of influenza the year before admission, about the same age; four brothers living and healthy, the eldest over forty; several of these are or were acrobats, and one stands quite six feet high. There are four sisters, all living and healthy. None of his relatives are remarkable for the size of their hands or feet, or are the subjects of any deformity. There is no history of tuberculosis, gout, rheumatism, or any kind of tumour. Patient is the third of his family, and has a wife and five children (youngest aged four), all in good health.

Previous history.—Born at Coventry in 1861, he lived in

London from 1868 to the present time, excepting from 1874 to 1885, when he was in Dublin, and during occasional absences while on tour. From twelve to eighteen years of age he worked on and off as an acrobat, being at the same time engaged in other occupations, chiefly umbrella making. He has no recollection of any serious falls. When fifteen years old he lost the tip of the right index finger in a printing machine; and nine years later he ran a needle into the middle joint of his left middle finger. Matter formed and discharged, and after about two months the joint healed up, but remained stiff and over-extended. No bone was known to come away. He always had large hands, and was muscular. Many years ago he had a "touch of rheumatism" affecting the joints of arms and legs, but was not laid up with it. He never had rheumatic fever, gout, or any definite illness since childhood, and was strong and healthy until the beginning of 1894. He married young (aged seventeen); he appears to have always been temperate, and denies syphilis, but had a slight attack of gonorrhœa at Dublin.

Present illness.—About February, 1894, he caught cold and had pains in the right side of his chest. The pains went away, but some cough remained with general weakness and pain in the back, which gradually increased until he had to give up work at the end of October, 1894. Up to this time he could use small tools without difficulty. He attended a few times in May, 1894, as out-patient at Westminster Hospital. The physician who examined him expressed a fear that he was consumptive, but no notice was apparently taken of his hands. These, he states, swelled up rapidly some six or eight weeks before Christmas, and assumed their present condition. He cannot say when his feet began to swell, and has worn the same sized boots all along. He occasionally had slight pains in hands and feet, but no headache of any consequence, and no affection of sight. He has been losing flesh "for a long time." His cough has been troublesome, keeping him awake at night, and sometimes causing vomiting; expectoration copious, mostly yellow phlegm, never noticed to be offensive. A few streaks of blood appeared in it three weeks before Christmas. He has had occasional night sweats, but "no fever." Breath short on exertion, occasional

flatulence, appetite remained good and bowels regular, but since he was out of work his wife has had to keep him and the family.

On admission.—An ill-nourished, somewhat anæmic, expressionless man, with large hands and feet, contracted chest, and high dorsal angular curvature. Height 5 feet 5 inches. Weight 8 stone 6½ pounds. Facies not remarkable in any way. Nose a little large, but not abnormally so, and its septum unsymmetrical but not thickened. No unusual development of eyelids, lips, ears, cheeks, or tongue. Malar bones and frontal sinuses not specially prominent. No prognathism or enlargement of lower jaw, alveolar processes, or other parts of the cranium, which has the average amount of symmetry. Teeth moderately good, and meet normally. Veins of face not dilated. Scalp covered with a good growth of brown hair; that on the face normally developed. No tendency to acne or special development of sebaceous follicles. Neck small, without special prominence of larynx. Thyroid body small, but can be felt.

Measurements of head and neck:

Cranium—		Cranium—	
Antero-posterior diameter	187 mm.	Bi-mastoid diameter	123 mm.
Mento-occipital ,,	208 ,,	Bi-auricular ,,	133 ,,
Mento-bregmatic ,,	227 ,,	Bi-malar ,,	108 ,,
Mento-vertical ,,	250 ,,	Bi-temporal ,,	113 ,,
Occipito-bregmatic ,,	150 ,,	Bi-zygomatic ,,	133 ,,
Bi-parietal ,,	150 ,,	Bi-angular ,,	105 ,,
Occipito-frontal circumference			550 ,,
Occipito-glabellar ,,			540 ,,
Length of lower jaw from articulations over chin			270 ,,
Neck diameters 83 × 105 mm. Circumference			330 ,,

Chest emaciated, somewhat cylindrical, but flattened anteriorly. Ribs permanently raised, the third pair thickened anteriorly, and the fifth pair both anteriorly and laterally, chiefly the latter. Free perspiration from axillæ, although the room was not specially warm. Left mamma slightly enlarged, not painful nor tender. No eruption or dilated veins over chest. Sternum flat anteriorly, and not abnormally wide. Slight flattening in both infra-clavicular and supra-mammary regions, chiefly due to wasting of pectorals. Chest movements restricted; at nipple level during inspiration 775,

expiration 769. Respirations 20—24, chiefly abdominal. *Posteriorly* a small kyphotic prominence about the fourth dorsal spine, projecting about 25 mm., the spinal column being almost flat above and below this point. Slight scoliosis is also present, the concavity being to the right, and the right shoulder slightly drooping. The prominent spine is not red, and not very tender, nor very much thickened, and no pain is caused by tapping head or pressing on shoulders, and the neck and loins can be freely moved without pain.

Right side.—There is slight dulness, bronchial breathing, and increased vocal resonance, with whispering pectoriloquy above and below the clavicle. The rest of the right front down to the fifth rib is hyper-resonant, with harsh breathing. Laterally, the middle zone is the same, while the lower half is dull on light percussion, hyper-resonant on deep percussion, breath-sounds there being feeble, and vocal resonance and fremitus little altered, while the heart-sounds are readily heard. Posteriorly, slight dulness over supra-spinous region, with bronchial breathing and increased vocal resonance externally; dulness at base for about an inch in scapular line, with diminished breath and vocal sounds and fremitus; also dulness round the kyphotic prominence, the rest being hyper-resonant. A few rhonchi and large moist râles are occasionally heard just above the liver. The area of dulness has a curved upper border as in pleuritic effusion.

Left side.—Left apex not very resonant, but not dull; breath-sounds feeble, vocal resonance and fremitus unaltered. Below this to cardiac area boxy resonance and feeble breath-sounds. Laterally the extreme axilla is not very resonant; slight loss of resonance on light percussion towards anterior axillary fold from third to sixth ribs, hyper-resonant nearly all over on deep percussion. Breath-sounds rather feeble, vocal resonance and fremitus unaltered; heart-sounds well heard over dull axillary patch. Posteriorly dulness round the kyphotic prominence, the rest being hyper-resonant with harsh breath-sounds. Occasional moist sounds towards base. Slight tenderness on percussion over lower scapular muscles on both sides. The sternum presents no abnormal dulness.

Heart impulse visible in fourth and fifth spaces inside left nipple line, feeble when felt. No epigastric pulsation. Area

of deep dulness extends to mid-sternum and upper border of third rib. Sounds somewhat feeble, first reduplicated at apex; no murmurs.

Pulse 144, full, regular, compressible. No atheroma detected.

Digestive organs.—Tongue coated, not enlarged. Mouth cavity normal excepting slight elongation of uvula. Abdomen somewhat prominent, comparatively hairless between umbilicus and pubes. No ascites. Splenic dulness slightly increased; spleen not felt below ribs. Hepatic dulness extends up to sixth rib in right nipple line; liver not felt below ribs.

Larynx normal. No aphonia or hoarseness.

Upper extremity.—Outer third of clavicle abnormally wide (34 mm.). Acromion process also enlarged. A bony prominence is seen near the root of each spine of scapula, larger on the right side. Shoulder-joints not freely moveable, and cannot be completely extended by patient. A little pain on active movement, but no tenderness; creaking occasionally felt on passive movement. No evidence of capsular thickening or effusion into joints, nor of any enlargement of upper ends of humeri. Upper arm wasted; muscles small and flabby. Shafts of humeri not enlarged. Elbow-joints look big. Probably bony thickening of lower ends of humeri and upper ends of ulnæ. Capsules feel thick, and may contain a little fluid. Movements restricted but not painful. Joints cannot be completely extended, flexion free. Forearms large, with marked thickening in lower fourth, chiefly noticeable on dorsal aspect. The enlargement is mainly or entirely bony, increasing diameters in both directions, but especially antero-posteriorly; it begins somewhat suddenly 8 cm. above wrist-joint, and reaches maximum about 2 cm. above the joint. The bone surface is smooth, not specially tender or painful, and the bony landmarks are not obliterated.

The position of the wrist-joint is shown by the usual constriction. There is possibly some capsular thickening, and perhaps a little effusion. Carpal bones appear slightly thickened. There is no alteration in the mobility of the joint, and no crepitus.

The hands are decidedly enlarged. Palms thick and flat, with ill-marked thenars and hypothenars, but the normal

hollow is not lost. Metacarpals not elongated; the head of each is enlarged, the rest of the bone feeling natural. Fingers large, bony, and spindle-shaped; the largest parts being at the middle joint, excepting in the thumbs, in which the terminal phalanges are the largest. The last phalanx of the right index finger missing. Middle joint of left medius over-extended, very large and stiff. Shafts of phalanges all decidedly thickened, especially antero-posteriorly, rendering them cylindrical. Terminal phalanges swollen at their ends, and somewhat blue and clammy; somewhat over-extended, especially as regards right ring and little finger, and left index and ring finger. The fingers as a whole appear to be too long in proportion to the hand. Nails large, thin, and strongly curved in both directions, especially in length. They occupy three fourths of the dorsum of the terminal phalanges, reaching nearly to the lateral borders of the fingers, and curving over the ends. Roots mobile and deep-set, slightly raised above the level of the middle phalanx. The body of the nail slightly pitted here and there, strongly striated lengthwise, and in a few instances also transversely, but not split. They are said by patient to grow more quickly than formerly. The nail changes are best marked in thumbs and middle fingers. Volume of hands slightly variable; the left is a little larger than the right. Movements of hands are clumsy and restricted, both active and passive. Patient finds a difficulty in buttoning his coat, and cannot clench his hands properly. The skin of the upper extremities is nowhere thickened, red, nor adherent. It is loose over upper arms, tight over forearms, especially tight and thin over phalanges. Perspiration is unusually free over dorsum of hands and fingers since beginning of illness. There is no œdema or undoubted thickening of soft parts of upper limbs beyond what has been mentioned. There may be some subcutaneous thickening over enlarged parts of hand and forearm, but the play of tendons is clearly visible over wrists and dorsum of hands, and there is no crepitus in their sheaths. The skin creases are visible but ill-marked over the enlarged parts. For measurements see Table I.

Lower extremities.—Some thickening of iliac crests. Hip-joints apparently unaffected. Thighs thin, with ill-developed

muscles. Knees large from bony overgrowth; patellæ very wide, and lower ends of femurs and upper ends of tibiæ wide and thick. Slight synovial thickening, but no noticeable effusion. No lipping or osteophytes to be felt. Slight painless crackling on passive motion. Active movements a little awkward and restricted. Veins over thigh, knee, and leg moderately enlarged and varicose; markedly pouched about ankles. Calf muscles ill developed. The lower half of left leg and lower third of right leg enlarged, the enlargement being more gradual than in the forearms, chiefly bony, but also involving soft parts, which are slightly œdematous, and partly hide the shape of the leg about the ankle, forming pads around the outer and inner malleoli. The bony swelling is most marked in the lower 7 or 8 cm. of the tibia and fibula, which are slightly tender. Ankle-joints are swollen, partly from synovial thickening, partly from effusion. The feet are swollen and somewhat shapeless; the big toes large at their ends, with strongly curved nails, the other toes being similarly affected but to a lesser degree. Movements are slightly restricted in ankles and feet. There is no pain or creaking on manipulation. The skin of lower limbs shows no abnormality beyond a very little sclerodermia over outer borders of feet, and is nowhere red nor adherent. For measurements see Table II.

Nervous system.—Gait awkward. No paralysis, ataxy, or tremors. Patellar reflexes lively on both sides. No ankle-clonus. Plantar reflexes lively. Intelligence good, but memory a little impaired. No headache. Sleeps well. Hearing good. No tinnitus. Sight not very good lately. No anæsthesia or numbness.

Genito-urinary system.—No abnormality or enlargement of external genitals. Has had no venereal desire for eighteen months. Urine clear, 1020, with slight excess of urates; no sugar or albumen.

Temperature normal. Patient is very sensitive to cold, and on slight exposure his hands become clammy, and a trifle blue at the finger tips.

Progress of the case.—He was put on cod-liver oil and an acid tonic mixture, and later on creasote ♏iv in mixture three times a day. On May 27th effusion was noted in the

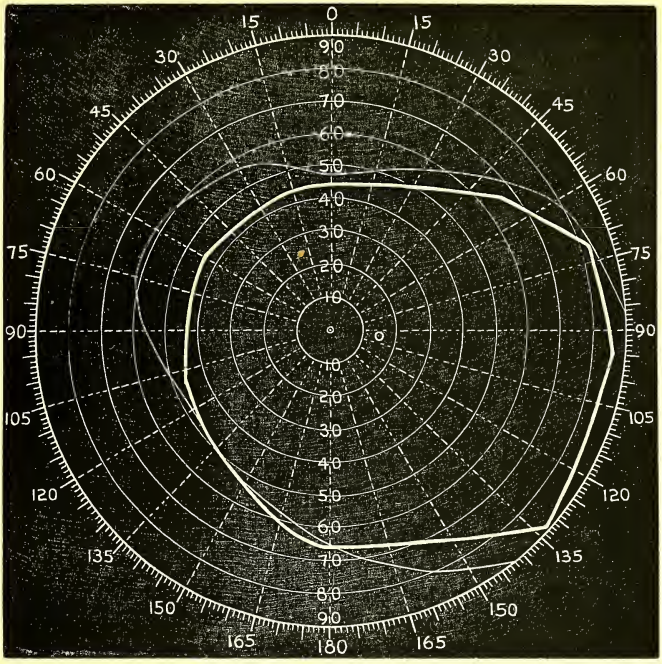
right knee. Three days later he was shown by Mr. Bowlby at St. Bartholomew's Hospital; there was then fluid in both knees. On June 10th casts were taken—for the St. Bartholomew's Hospital Museum—of his hands and spinal projection. Slight streaks of blood appeared in the sputum on this day only. June 17th, urine 1023, acid, slightly cloudy when first passed, clearing up on heating. No albumen. Doubtful sugar reaction with picric acid test. June 24th, examined for discriminating power of upper extremity. Results.—Pad of middle finger, 7 mm.; palm, 9 mm. (somewhat variable); dorsum of hands, 15 mm.; back of wrist, 30 mm.; back of forearm, 45 mm. (left side, 30—40 mm.); front of forearm, 40 mm. June 28th, sight examined by Dr. Lawford.

R. $\frac{6}{9}$ partly
L. $\frac{6}{9}$ partly $+$ 1 D. $\frac{6}{6}$ fairly. Reads 1 J. with difficulty.
$+$ 1·5 D. reads 1 J. easily.

On ophthalmoscopic examination media clear. O. D.s healthy in colour. Retinæ and choroids show no pathological condition, except perhaps slight turgescence of retinal veins. Pupillary reaction to light, and in convergence normal. Movements of eyeballs and eyelids seem normal. Visual fields about normal, as taken with Hardy's perimeter with 10 mm. white square in good daylight (see diagrams).

July 8th.—Suspected effusion into right pleura, as the temperature was 99·8°, and the vocal resonance, fremitus, and breath-sounds over dull area at right base seemed less than before. Three days later admitted as an in-patient in one of Dr. Squire's beds.

On admission temperature was normal. The dull area on right side reached fourth space in right nipple line, fifth space in mid-axillary line, and eighth rib in scapular line. Moist crepitations were heard just above hepatic area. Friction sounds near sternum below right mammary region. Liver not felt below ribs. On the left side sharp crepitations were heard over the dull patch near anterior axillary border and moist sounds at base posteriorly. In all other respects the physical signs remained as before. The patient had gained flesh during attendance as out-patient, and was generally in better health. Cough was less troublesome, but he still complained of pain and weakness in the back. Iodine paint was applied to right side and both bases, but in all other respects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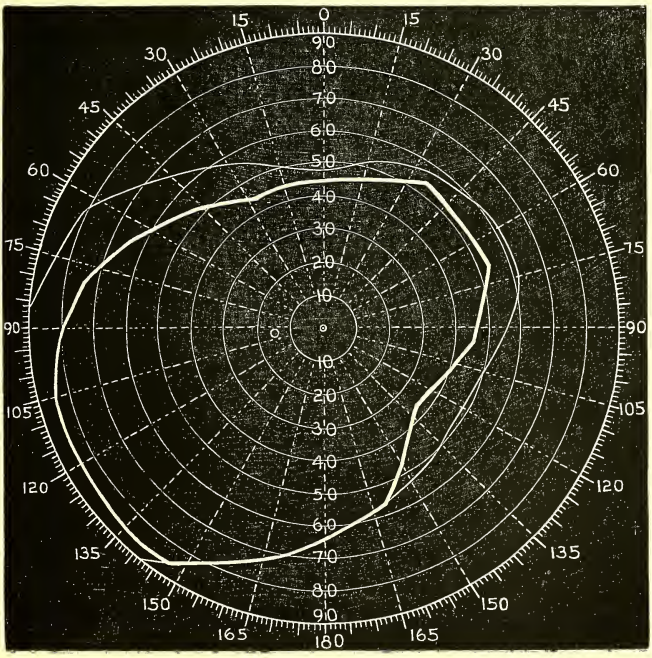
Right.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Left.

the treatment was unaltered. On July 22nd the chest was as before, but vocal fremitus was clearly felt as low as eighth rib in right mid-axillary line, dull area remaining as before. Still decided effusion in knee-joints, which were directed to be painted with iodine.

Circumference above knee .	right 350 mm.	left 352 mm.
„ over knee .	„ 380 „	„ 380 „
„ below knee .	„ 320 „	„ 322 „

August 2nd.—Shown at the annual meeting of the British Medical Association. At this time the hands were less swollen and more serviceable. Measurements of various parts of the body showed uniformly greater figures, owing to the better state of his nutrition. He remained an in-patient until the end of October. During his stay in the hospital further notes were taken, for some of which I am indebted to the resident medical officer, Dr. Coles, whom I wish to thank for his courtesy in supplying me with notes and photographs, and for his careful attention to the case. The blood was examined on two occasions with v. Fleischl's hæmometer. It was abnormally fluid, and contained the first time 20 per cent., the second time 45 per cent. Hb. The urine was found to be usually below the average in quantity, with a corresponding deficiency in urea. Thus on one occasion it was 1026, 29 ounces passed in twenty-four hours; very acid in reaction, with copious deposit of amorphous urates and crystals of calcium oxalate, a faint trace of albumen; no sugar, and no renal casts or pus. Urea 355¼ grains in twenty-four hours. The temperature sense was tested by Dr. Coles, and found to be normal. The sputum was several times examined for tubercle bacilli both in the in-patient and out-patient department, but with uniformly negative results. The chest signs remained substantially the same, except that the crepitations disappeared from the dull patch in left axilla, râles and rhonchi nearly disappeared from all parts of the chest, vocal resonance and fremitus increased over right side, and expectoration greatly diminished. The temperature on a few occasions rose to 100°—101°, but was usually normal. His skin became clearer, and he gained in weight. The effusion gradually disappeared from the knees, elbows, and wrists. Chest measurements taken on August 12th were as follows:

at nipple level, with inspiration 811, expiration 780; under arms 853; at lower end of sternum 785. He continued as an out-patient, and towards the end of 1895 there was noticeable diminution in the bony prominences above the wrist. On March 13th he was suddenly seized with profuse hæmoptysis, which lasted several days, so that he was by my advice admitted into St. Thomas's Hospital under Dr. Acland.

It is unnecessary to say much about the case, which is obviously one of typical osteo-arthropathy. As regards the chest there was evidently an old cavity at the right apex, and a more recent secondary patch of consolidation on the left side. An old pleurisy (perhaps dating back to February, 1894) had left a thickened pleura and displaced heart. Whether there was fresh effusion in July, 1895, I am unable to say positively, although it then seemed likely. The kyphosis, which is high in the back, contrary to the rule in osteo-arthropathy according to Marie, has all the characters of quiescent Pott's disease; and this and the lung trouble were probably both tubercular in origin.

I have to thank Mr. Stanley Kent and Dr. Barry Blacker for some excellent skiagrams of the case, some of which are here reproduced, together with one of a normal hand for comparison. I am also indebted to Dr. Blacker for a general report on the skiagraphic appearances, which is inserted below. It is unfortunate that no skiagrams were taken of the bone changes in their early stages.

Dr. Blacker's Report.

Terminal phalanges: expanded portions for the support of the finger pulps enlarged and pointed upwards; shafts of the bones thickened, small spurs at the insertion of the extensor communis and flexor profundus digitorum. *Middle phalanges:* increase of compact bone at the sides of the shafts. *Proximal phalanges:* same accentuation of compact bone, almost obliterating the lateral concavities, and in the middle finger causing them to appear convex. The increased formation of bone seems to cease at the articular cartilages, causing the heads to appear contracted. *Metacarpal bones:* same condition, but not so marked as in the proximal phalanges. The middle finger is again the most

altered. *Bones of the thumb :* general enlargement of all the bones, the filling in of the concave surfaces well marked.

General remarks on the hand.—The bones do not appear to be lengthened when compared with a normal adult hand, but to be mainly increased laterally, from new deposit of compact tissue, the cancellous tissue remaining unaltered. The sesamoid bones in the flexor brevis pollicis seem to be normal ; there is, however, an extra one between the heads of the metacarpal bones of the fourth and fifth fingers. In the lateral view of the fingers the phalanges do not appear to be so much altered, which would seem to indicate that the thickening is more from side to side than from before backwards. The convex surface of the nail is well shown. The alteration in the shape of the bones gives the negative a stunted appearance ; but the bones are of the same length as in a normal hand of the same relative size. The edges of the bones as seen in the negative present a slightly blurred appearance, especially in the proximal phalanx of the middle finger. The *carpus* shows no obvious structural change ; perhaps the bones are a little larger than in a normal wrist. The shafts of *radius and ulna* appear to be generally enlarged, and the same can be said of the olecranon and *humerus,* the enlargement being apparently more from side to side than from before backwards. The bone ends helping to form the elbow-joint do not present any obvious change.

In the foot the same changes are observable in the metatarsus and phalanges, but the concave surfaces are not so obviously obliterated, and the changes generally seem to be less than in the hand, excepting the bones of the great toe, which are all very wide, both metatarsal and phalanges. On the head of the first metatarsal bone are two enlarged sesamoid bones, which is remarkable, as the sesamoid bones elsewhere do not show any marked enlargement.

TABLE I.—*Measurements of Upper Limbs.*

	June, 1895. mm.	Mar. 1896. mm.
Length of *upper arm,* acromion to outer condyle, arm adducted .	265	
„ to olecranon „ .	340	
forearm, olecranon to back of styloid process of radius	250	
inner condyle to styl. pr. ulna, elbow extended	250	
outer „ „ radius „	240	

	June, 1895. mm.	Mar. 1896 mm.
Length of *upper limb*, acromion to tip of medius, arm adducted	710	
Shoulder, vertical circumference	375	
circumference over deltoid	220	
head of humerus, antero-posterior diameter	78	
Upper arm, circumference over deltoid insertion	180	
„ middle over biceps	200	
Elbow, transverse diameter between condyles	75	
antero-posterior diameter to above olecranon	50	
„ „ to olecranon	60	
width of olecranon	33	
circumference above condyles	185	... 220
„ over olecranon (extension)	230	... 245
„ below „ „	225	
antero-post. diam. from below olecranon to biceps insertion	55	
Forearm, middle, antero-posterior diameter, radial side	23	
ulnar side	28	
„ transverse diameter	58	
„ circumference	185	
50 mm. above wrist line, radial side, antero-post. diam.	22	
„ „ middle „	30	... 35
„ „ ulnar side „	25	
„ „ transverse diameter	55	... 60
„ „ circumference	172	
25 mm. above wrist line, radial side, antero-post. diam.	29	
„ „ middle „	40	... 43
„ „ ulnar side „	27	
„ „ transverse diameter	60	... 63
„ „ circumference	182	... 182
over styloids, radius, antero-post. diam.	36	... 30
„ ulna „	34	... 29
„ transverse diameter	62	
„ circumference	188	... 190
Wrist, antero-posterior	43	... 43
transverse	63	... 64
circumference	185	... 185
antero-posterior scaphoid to base of second metacarpus	48	... 43
Hand, lower fold of wrist to middle-ring web	85	
„ to little finger crease	90	
„ „	85	
tip of thumb in adduction from styloid process of radius	150	
tip of medius from styloid process of radius	200	
transverse diameter of metacarpus opposite "bases"	49	
„ „ middle	60	... 65
„ „ heads	70	... 80
circumference (hand flat) over metacarpal heads	212	... 220

Table I (*continued*).

	Dorsal, length.	Base, width.	Middle, thickness.	Head, width.	Head, thickness.	Length from radius.
Metacarpals, thumb .	48	18	—	23	28	70
index .	58	—	28	—	24	85
medius .	66	—	34	—	28	100
annular .	60	—	31	—	25	92
minimus .	60	—	32	—	24	82

Fingers.

June, 1895.	Whole finger.	Proximal phalanx.							Middle phalanx.							Distal phalanx.			
	Dorsal.	Middle.				Joint.			Middle.				Joint.			Middle.			
	Length.	Length.	Width.	Thickness.	Circumfer.	Width.	Thickness.	Circumfer.	Length.	Width.	Thickness.	Circumfer.	Width.	Thickness.	Circumfer.	Length.	Width.	Thickness.	Circumfer.
Thumb . .	72	40	18	17	75	—	—	—	—	—	—	—	20	18	84	32	22	18	75
Index . .	—	50	22	20	80	—	—	80	—	—	—	68	—	—	62	—	—	—	65
Medius . .	109	55	22	21	79	—	—	81	35	—	—	77	—	—	67	30	—	—	65
Ring . .	—	48	—	—	75	—	—	83	—	—	—	70	—	—	67	28	—	—	65
Little . .	—	46	—	—	68	—	—	70	—	—	—	65	—	—	58	22	—	—	57
March, 1896.																			
Thumb . .	—	—	20	19	78	—	—	—	—	—	—	—	21	20	78	—	20	19	80
Index . .	—	—	20	20	80	21	18	82	—	20	18	78	18	15	70	—	19	18	68
Medius . .	—	—	21	21	80	23	21	85	—	21	19	78	20	16	69	—	19	16	66
Annular .	—	—	19	18	72	21	19	81	—	20	17	75	18	15	66	—	18	15	65
Little . .	—	—	18	17	70	19	16	70	—	18½	15	65	16	15	60	—	15	13	58

Nails.

	June, 1895.		March, 1896.		
	Width.	Length.	Width.	Length.	Lunula.
Thumb, R. .	30	20	29	18	3
L. .	—	—	30	20	4
Index, R. .	—	—	—	—	
L. .	30	22	20	20	
Medius, R. .	—	—	25	18	
L. .	—	—	26	22	
Annular, R.	—	—	25	20	
L.	—	—	25	29	
Minim. R. .	—	—	20	16	
L. .	—	—	21	20	

Volume of hand to 25 mm. above dorsal line of wrist 16¼ oz. (July 29th).

TABLE II.—*Measurements of Lower Limbs.*

	June, 1895.		March, 1896.	
	R.	L.	R.	L.
Length from articular surface of tibia internally to tip of inner malleolus "as a chord"	—	323	—	—
of foot	—	238	—	—
Diameters: transverse above knee	75	65	84	84
condyles	99	96	100	90
head of tibia	90	90	98	100
tibia, ant. surf. at junct. upper with middle fourth	52	57	—	—
tibia, ant. surf. middle of shaft	44	45	—	—
tibia above malleoli	43	47	—	—
tibia and fibula, 75 mm. above ankle-joint	65	65	65	65
tibia and fibula, between malleoli	76	76	82	82
patella, horizontal	60	60	65	65
vertical	60	58	—	—
thickness of sole opposite middle of arch	58	—	—	—
thickness of sole opposite root of big toe	28	—	—	—
transverse of foot opposite bases of metatarsals	82	—	—	—
transverse of foot opposite heads of metatarsals	92	—	—	—
Circumferences: thigh above knee	318	323	363	356
over knee	360	352	377	360
leg below knee	300	304	340	330
middle	256	—	—	—
75 mm. above internal malleolus	—	212	—	—
50 mm. above internal malleolus	230	235	230	240
over malleoli	291	295	275	275
foot, mid-dorsum	235	—	—	—
root of toes	250	—	—	—

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DESCRIPTION OF PLATE I,

Illustrating Dr. F. R. Walters' Case of Hyperplastic Osteo-arthritis.

Dorsal view of J. M—'s forearms and hands.

This photograph was taken in October, 1895.


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DESCRIPTION OF PLATE II,

Illustrating Dr. F. R. Walters' Case of Hyperplastic Osteo-arthritis.

FIGS. 1 and 2.—Side views of J. M—'s left hand.

These photographs were taken in October, 1895.

Fig. 2.

Fig. 1.

DESCRIPTION OF PLATE III,

Illustrating Dr. F. R. Walters' Case of Hyperplastic Osteo-arthritis.

Skiagram of normal hand (by Dr. Blacker) for comparison with Plate IV.

A. Barry Blacker, M.D., Photo.


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DESCRIPTION OF PLATE IV,

Illustrating Dr. F. R. Walters' Case of Hyperplastic Osteo-arthritis.

Skiagram of J. M—'s right hand (taken by Mr. Stanley Kent in April, 1896).

See Dr. Blacker's report.

E. Stanley Kent, Photo.

DESCRIPTION OF PLATE V,

Illustrating Dr. F. R. Walters' Case of Hyperplastic Osteo-arthritis.

Skiagram of part of J. M—'s right foot (taken by Dr. Blacker in November, 1896).

See Dr. Blacker's report.

d. Barry Blacker, M.D., Photo.


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